

# The Iron Age

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Published every Thursday Morning by DAVID WILLIAMS, Nos. 66 and 68 Duane Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXVII: No 10.

New York, Thursday, March 11, 1886.

\$4.50 a Year, Including Postage.  
Single Copies, Ten Cents.

## The Gaskill Fire Hydrant.

We present in the accompanying engravings an elevation, section and details of the Gaskill Fire Hydrant, made by the Holly Mfg. Co., of Lockport, N. Y. The hydrant possesses several novel features which will commend it to water-works managers. The frost case is bolted to the base with two bolts, and the top is held to the base with four bolts, and is so arranged that the inside case and valve can be taken out without digging up the hydrant, and can be replaced and repaired at any time, and without operating any screws below the ground. All the threads that need to be operated for taking the hydrant out are where they can be oiled and care can be taken of them. The drip-valve is of an entirely new design, and is positive both in opening and closing. It is shown clearly in both Figs. 2 and 3, from which it will also be seen that the main valve cannot be opened or closed without operating the drip-valve. The screw working the main valve is placed in the cap at the top of the hydrant and above the packing gland, outside of the space occupied by the water, so as to render it free from corrosion. Fig. 3 shows a double-gate hydrant, which does not depend upon any springs for the proper action of the auxiliary gate, but is as reliable as any straightway-valve. Fig. 4 represents a cross-section, showing some of the valve details. The hydrants are made with either a  $4\frac{1}{2}$  or  $6\frac{1}{2}$  inch stand-pipe, and of any of the following lengths of cases: 2 feet 6 inches; 3 feet; 3 feet 6 inches; 4 feet; 4 feet 6 inches; 5 feet; 5 feet 6 inches; 6 feet; 6 feet 6 inches, and 7 feet. They are made of extra strength and will stand extreme pressures. It will be noticed that the main valve closes with the current, and when closed will not leak. The valve-seat is of leather, which experience has demonstrated to be the best, and which can be repaired at a trifling cost. The water-way is direct and free when the valve is open.

## The Theory of Gas Engines.

We present below a translation of a portion of the work entitled "Nouvelles Recherches sur les Conditions Pratiques de Plus Grande Utilisation de la Chaleur et en Général de la Force Motrice," by M. Beau de Rochas, a French scientist. For this we are indebted to the *Engineer*, of London. This book was the one frequently referred to in the late trial—Otto vs. Steel—and which at one time, owing to its existence in the library of the British Museum, it was thought might be held to constitute "prior publication" of the matters at issue. The work forms a valuable contribution to the theory of heat motors:

**Combined Gas and Steam Motor.**—When we examine what takes place in the combustion chamber of a gas-fired boiler we are struck with the enormous volume which gases raised to a high temperature attain. If the combustion, on the other hand, takes place at constant volume, the dilation will be replaced by an equally considerable accession of elastic force, and the return to the original pressure by means of expansion will give precisely the same volume at the same temperature as if the heating had originally taken place under constant pressure. It is directly evident from this that in the mere fact of combustion there may be a production of power of an order of considerable greatness and completely independent of that which would afterward result from the formation of steam by the cooling of the burnt gases. From this we conclude that the complete utilization of the phenomena of combustion requires that we should at the same time profit by the elastic force which gases can directly acquire from combustion at constant volume, and the elastic force which they can subsequently communicate to steam by giving up to it their dilating heat—a heat which is identically the same as if they had been heated without producing an excess of elastic force over the surrounding pressures. This complete utilization would have been manifestly impracticable with the use of solid combustibles alone. It becomes infallible on their previous conversion into gases, which are themselves combustible. And such is the immense final result of the invention of gas furnaces, the priority of which belongs to MM. Thomas and Laurens, but in respect of which it is only fair to afford considerable recognition to the scientific labors of MM. Helman in France and Faber Dufour in Germany.

We must henceforth, then, consider as essentially incomplete—and so consider from our knowledge of the cause—all gas engines alone and steam engines alone, and it is easy to demonstrate that the one is necessarily the normal complement of the other. The action of gases as vehicles of motive force assumes the previous starting of the motor apparatus, for, precisely because gases exist already formed and cannot do work without expansion, they are incapable of setting themselves to work and can enter as active agents only into a system already in motion. It is for this reason that there have never been and never will be gas engines, whatever their principle, which can be applied to cases in which the starting requires more or less powerful or rapid effort without the simultaneous concurrence of some external force. Gas engines pure and simple are, therefore, essentially engines of small powers. Steam engines, on the

contrary, are capable of the most powerful direct action, but at the price of an excessive expenditure of heat. This is, in effect, how M. Regnault expresses himself on the point ("Comptes Rendus," April 18, 1853): "In air motors—allowance being made for exterior losses and for mechanical obstacles which may present themselves in practice—all the heat expended is utilized for working power; while in the best steam engine the heat utilized in mechanical labor is not the twentieth part of the heat expended, and it is even much less in most cases." This normal inferiority of return is a certain sign that steam alone cannot be a truly economical agent for the transmission of work; but the very mechanism of its foundation makes it the indispensable starting agent.

As for the accidental losses, if in combining the gas engine with the steam engine we arrange things in such a way that these losses are turned more especially to the profit of steam-raising itself, we have realized the maximum practical effect, for even if gases are really difficult to handle it is chiefly by reason of their great dispersive power, and if the losses accruing under this head (already supposed as reduced to their possible minimum) are besides put to their best possible use in a corresponding production of steam, we have all the useful effect of the steam as hitherto, plus that which we can obtain from the elastic force of the gas itself.

In conclusion it is necessary to observe that among the necessary and rational con-

ditions in the steam boiler. The exhaust of the steam cylinder will then serve most readily to diminish the cushioning of the gas cylinder by facilitating the expulsion of the burnt and cooled air out of the engine, at least unless we can find a more useful employment of the steam in condensing it. There being nothing requiring modification in the arrangement of steam cylinders, the practical use of which appears to have followed close upon their being perfected in each particular case, we will only occupy ourselves here with the designing of gas cylinders, the practice in which is much less advanced. We shall distinguish two general cases according as the gas to be burnt is taken at atmospheric pressure or is previously compressed.

destruction of the machine if the walls were not maintained at a very low relative temperature. This low temperature would be an energetic cause of cooling in the gases if it could not be met by other arrangements. But there will always be only a very slight drawback from direct utilization if the heat thus dissipated gives return in producing steam. The gas cylinders, as well as their frames, will therefore be surrounded by water, and placed, by means of their exterior surfaces, in communication with the boiler in such a way as to insure the circulation of the water and the creation of steam. The elevation of temperature, even if very great, would not otherwise cause any sensible inconvenience with the walls maintained at a constant temperature. It must be understood, in fact, that the metal walls, even though we suppose them to be very thick, can always transmit the total heat furnished to them without their temperature at the point of contact with the hot air ever being able to rise to an appreciable extent above temperature corresponding to a given proportion of combustible gas, and consequently to a known pressure after combustion there is a certain length of suction—we should say "inlet" in case of a steam cylinder—for which the work developed in the cylinder is a maximum. The variation in amount of suction, answering in each case to the maximum of work, being confined within narrow limits, the use of a slide will perfectly suffice to obtain the greatest variation in the yield of combustible gas. The arrangement, therefore, of the gas cylinders in the case in question can be made in the simplest manner with a common slide-valve, modifying, it is always understood, the forward and backward movements of it to meet this particular requirement.

## Arrangement with Previous Compression.

—The arrangement before described appears certainly the simplest that could exist. It will perhaps be the only one applicable to locomotives. Then the increase of utilized power resulting from it will certainly be clear gain, and, without any doubt, out of proportion to the cost of setting up. But the true conditions of the best employment of the elastic force of gases—at least its most important conditions—are not there observed; and simplicity is perhaps only acquired at the expense of utility. These conditions, in fact, are four in number: 1. The greatest possible cylinder space with the least possible exterior surface. 2. The greatest possible quickness of action. 3. The greatest possible expansion. 4. The greatest possible pressure at the commencement of the expansion. The dispersive power of gases, so favorable to the use of boiler tubes, is evidently, on the contrary, an obstacle to the utilization of elastic force developed in the gaseous mass. Now, we have seen that in the case of boiler tubes the efficiency—that is to say, the heat transmitted—was proportional to the diameter of the tubes. The loss would therefore be in inverse ratio to the diameter in the case of cylinders. But this is only applicable to cylinders of very small diameter; and the loss decreases in reality in a more rapid proportion than the diameter increases. Therefore an arrangement which, for a given consumption of gas, will give cylinders of the greatest diameter will be that with which the greatest direct utilization of heat will correspond in this respect. We equally conclude from this that, so far as possible, we must only employ one gas cylinder in each separate machine. But dispersion depends also upon time. Cooling, then, will be as much greater, other things being equal, as the working pace is slower. Now, a more rapid working pace seems to imply, as a consequence, cylinders of a smaller volume; but this contradiction disappears when one reflects that the length of stroke is not necessarily related in an invariable manner to the cylinder volume for a given expenditure. In like manner as for the elastic force of steam the utilization of the elastic force of gases requires that the expansion should be the most prolonged possible. In the arrangement above described there is a maximum of expansion for each particular case. Thus the effect is necessarily limited. The advantage, therefore, rests with an arrangement which will permit of giving back to the machine that which we may call the free play of the expansion—that is to say, the power of expanding so far as we may think it convenient within the limits only imposed by the nature of things. Finally, the utilization of the elastic force of gases still depends on one element which is entirely their own, but which is, at bottom, intimately connected with the utility of prolonged expansion. This element is compression, which should be the greatest possible for the greatest effect. It can be easily seen that we are dealing here with heated expansion obtained after cold compression, which is a way of prolonging the expansion in some sort inverse to that which consists in causing a vacuum—a way to which steam could not adapt itself, it being always understood that all compression inevitably causes an equivalent condensation in such a way that, even supposing steam to be combustible, instantaneous heating would be rendered impossible by reason of it. We can get as indefinite a utilization of the elastic force of gases by compressing them indefinitely before heating as we can get an indefinite utilization of the elastic force of steam by indefinitely prolonging expansion. But practically we soon attain an impassable limit. It is that

(Concluded on page 5.)



Fig. 1.—Elevation.

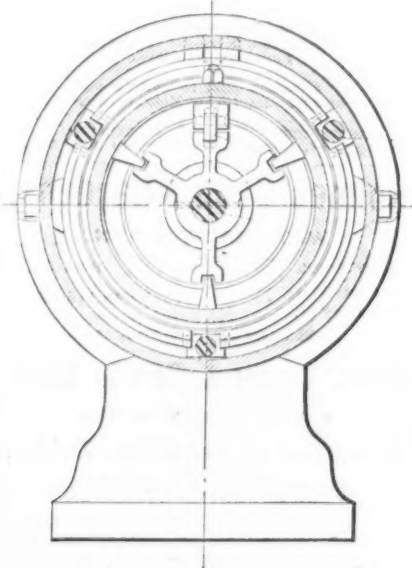


Fig. 3.—Cross-Section.

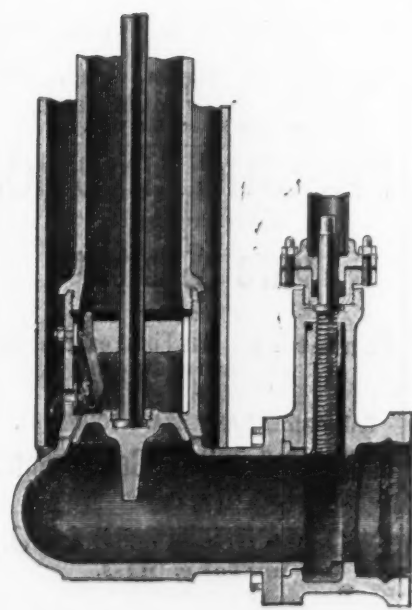


Fig. 4.—Section of Lower Part of Double-Gate Hydrant.

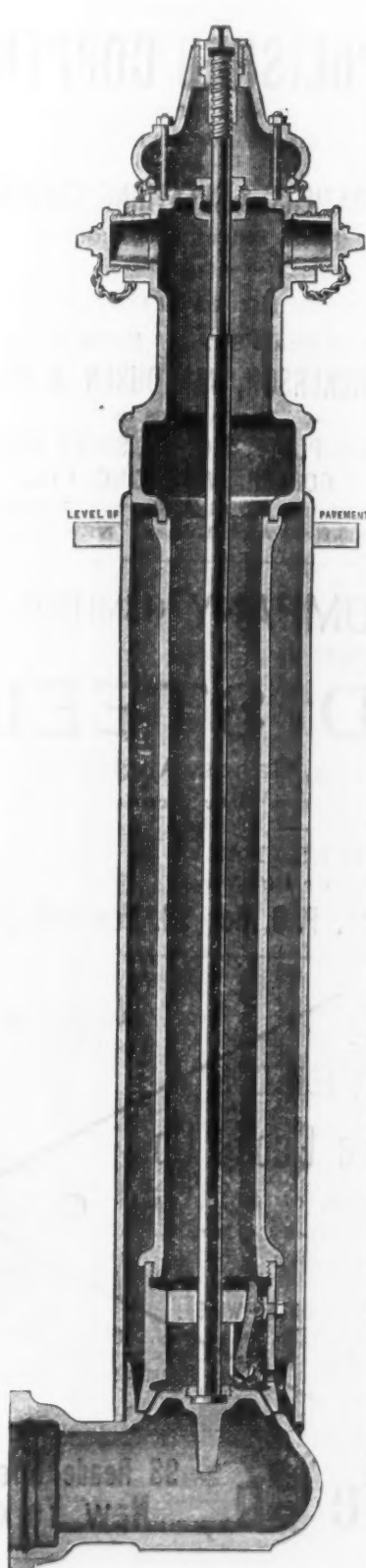


Fig. 2.—Vertical Section.

THE GASKILL FIRE HYDRANT, CONSTRUCTED BY THE HOLLY MFG. CO., LOCKPORT, N. Y.

Such, then, is the proper use of steam—to be, if not the preponderating expansive power, at least the finger always ready to press the trigger.

This proposition may appear in contradiction to certain facts which would tend to establish that it is difficult to obtain from gases a great power of expansion. The permanent gases appear, in fact, perhaps even more sensitive than vapors to the various causes of loss of heat. But we must distinguish between normal losses and accidental losses, notably by dispersion. Permanent gases ought to be considered as vapors infinitely below their point of saturation, and it is impossible that they can restore in any case one particle of their specific heat. It follows from this that they ought in working to cool at a much greater rate than vapors. But it is of little importance whether the curve of pressure falls more or less rapidly on expansion if the useful effect is in the end more consider-

able. As for the accidental losses, if in combining the gas engine with the steam engine we arrange things in such a way that these losses are turned more especially to the profit of steam-raising itself, we have realized the maximum practical effect, for even if gases are really difficult to handle it is chiefly by reason of their great dispersive power, and if the losses accruing under this head (already supposed as reduced to their possible minimum) are besides put to their best possible use in a corresponding production of steam, we have all the useful effect of the steam as hitherto, plus that which we can obtain from the elastic force of the gas itself.

**Arrangement without Previous Compression.**—Combustible gas and fresh air are drawn in during a portion only of the stroke of the pistons of the gas cylinders. These cylinders thus perform the function of suction bellows by drawing in air for the supply of the cupola. Taps and valves regulate the access and proportions of the two descriptions of gas. The mixture is effected at low temperature in conduits arranged for the purpose, and ignition is produced by known processes. The volumes of the gas and steam cylinders are arranged in accordance with the expenditure of the two fluids. Nevertheless, the steam cylinders ought to be of themselves powerful enough to start the whole machine. It could then be arranged, according to circumstances, that the steam throttle-valve might be entirely opened for the purpose of starting, and normally more or less closed during working. The high temperature produced in the gas cylinder by direct combustion would be a cause of speedy







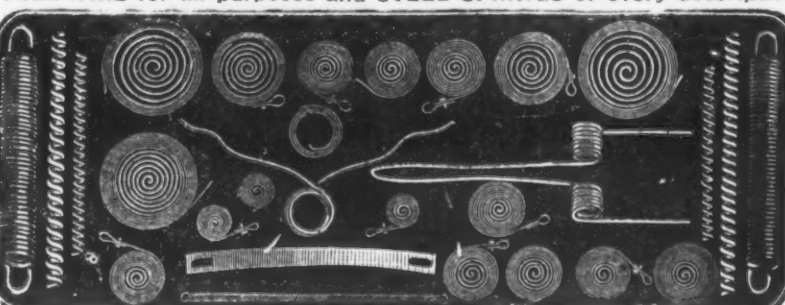
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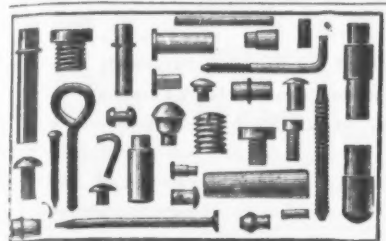
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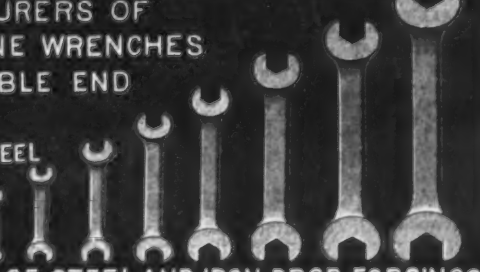
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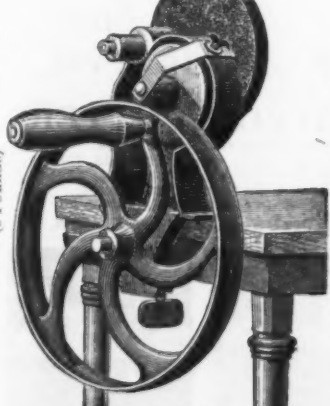
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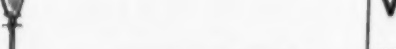
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Special Wheels for Furnace and Mine Cars.

(Concluded from page 1.)  
at which the raising of temperature due to previous compression brings about spontaneous ignition. In fact, in their continuing compression we shall only recover from the expansion up to this same point the work furnished by all useless action. There, then, is the limit imposed by the nature of things, and the final advantage in respect of utilization will rest with an arrangement which will permit of its attainment.

The question being thus propounded, the sole arrangement really practicable consists evidently in forthwith employing but one cylinder, so that it is the largest possible; and, further, in reducing the resisting movements of the gases to their absolute minimum. Then, and for the same side of the cylinder, we are naturally led to execute the following operations in a period of four consecutive strokes: 1, suction during an entire stroke of the piston; 2, compression during the following stroke; 3, ignition at the dead point, and expansion during the third stroke; 4, forcing out of the burnt gases from the cylinder on the fourth and last return stroke. The same operations being reproduced on the other side of the cylinder in a similar number of strokes of the piston, there results a particular sort of single-acting machine, we might say of half power, but which evidently satisfies the condition of largest possible cylinder and at the same time that condition (which is still more important) of previous compression. We see at the same time that the velocity of the piston is the greatest possible in relation to the diameter, since we do in a single stroke the work for which we should otherwise take two; and we evidently cannot do more. The temperature of the gas coming from the cupola is appreciably constant; that of the external air relatively varies only between narrow limits. Then the initial temperature of the mixture at the moment of the suction into the cylinder will also be appreciably constant. It will therefore be possible to determine the limit of compression at which ignition would become inevitable, and to arrange the machine accordingly. We shall thus constantly have the absolute maximum effect for each proportion of combustible material. We shall at the same time be freed from the intervention of electricity; for, the starting being effected by the action of the steam, the gases need never be introduced until the speed shall have become sufficient for ignition to be produced with certainty. In all cases compression will favor instantaneous ignition by helping complete mixture and in raising the temperature. In fine, and with an initial temperature corresponding to a pressure of five to six atmospheres in the boiler, ignition will be spontaneously produced with a degree of compression reaching to about one-fourth of the original volume—at least, if we neglect the effect of dispersion. Then the pressure after ignition would attain barely 30 atmospheres; and as we are dealing here with the case in which combustion is effected without excess of air, the pressure would necessarily be lower in all other cases. It is therefore probable that in many cases we can really attain the absolute limit of utilization.

To sum up, while manifestly lending itself in the simplest possible manner to the utilization of elastic force developed in the gaseous mass by combustion under constant volume, the arrangement now in question is not less simple than the preceding one—at least, unless we consider as a complication the necessity (or rather the convenience) of employing in some cases distribution by check-valves. This distribution is generally the most advantageous, and there is nothing to prove that it is not applicable even to locomotives, and, above all, to the case in question.

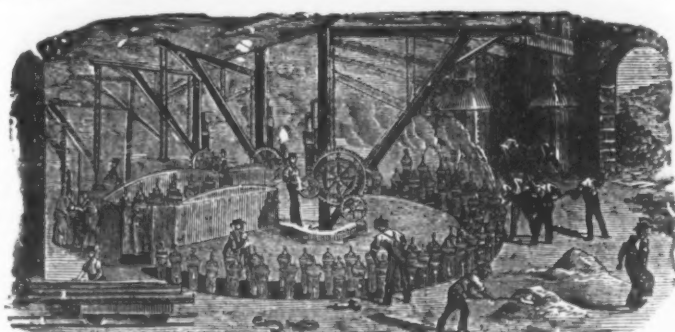
The most powerful gas well in the world is in Washington County, Pa. The flow was well-nigh beyond control and there was constant danger that the tubing and all connected with it might be blown in pieces. A Pittsburgh correspondent, under date February 25, says: "A novel plan was conceived to save the well. A rig was built less than 100 feet from the roarer, and machinery was brought over from this city to bore another well and draw off, if possible, the McGuigan's product. Drilling was commenced 60 days ago. Instead of 3-inch casing the new well as it progressed was cased with 6-inch heavy iron pipe and well secured. Fast time was made. When the well was 2238 feet, the depth of the McGuigan, scarcely any gas was found, but this week the bit touched nature's store at 2250 feet, just 12 feet deeper than its neighbor. Tools were blown out and then the greatest flow yet found in the Washington field asserted itself. Instantly an effect was noticed on the McGuigan well. Its roar lightened in sound and its pressure weakened. A large amount of its product issued from the new well. Yesterday the McGuigan well was 'screwed down' and the experiment completed. By screwing it down tight a still larger amount of gas was found to issue from the new hole. In this way the pressure of the old well has been reduced to a safe point, while the new one is greater than the original McGuigan. Some mysterious connection exists between the two wells down 2250 feet under the earth's surface, by which each well can regulate the other at the will of man."

It appears that the idea of telegraphing from one moving train to another or to a fixed station, lately brought conspicuously into notice, was long ago covered by patents in possession of the Phelps Induction Co. The system has worked successfully for more than a year on the Harlem River branch of the New York, New Haven and Hartford road, on which it is soon to be extended to New Haven and beyond. Mr. Edison's idea is to telegraph by static induction through the space intervening between the metallic surface of a car and a wire on poles at the side of the road. By the Phelps plan an induced current passes from wires in a tube under a car to a wire midway between the rails or beside one of them throughout the length of the track and resting on the sleepers.



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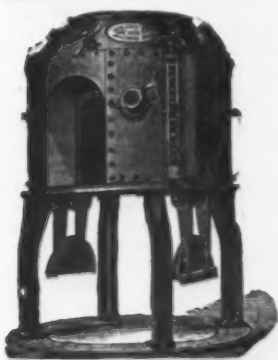
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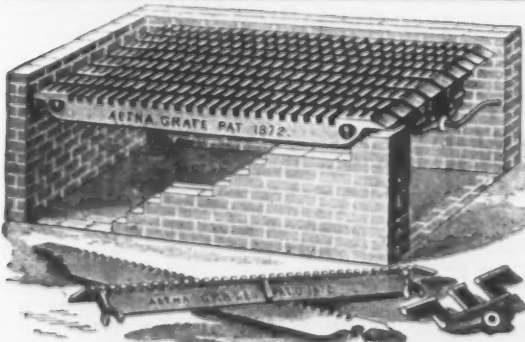


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The **Aetna Grate**

THIS IS A PRACTICAL AND THOR-  
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**SHAKING GRATE BAR.**

Has been in use over five years, and  
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operation, easily worked being oper-  
ated in sections in wide furnaces;  
gives over sixty per cent. Air Surface;  
very durable, interchangeable, and  
can be put in any furnace without  
delay or change of any kind. De-  
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**Aetna Grate Bar Comp'y,**  
110 Liberty St., New York.

Established 1861.  
**THOMAS C. BURROWS,**  
Agent for Jersey City Steel Company,  
Successors to JAS. R. THOMPSON & CO.,  
Manufacturers of **STEEL** Of All Descriptions.  
WAREHOUSE, 99 and 101 JOHN ST., NEW YORK.

**STANDARD STEEL CASTING CO.,**  
THURLOW, PA.,  
Open Hearth and Crucible  
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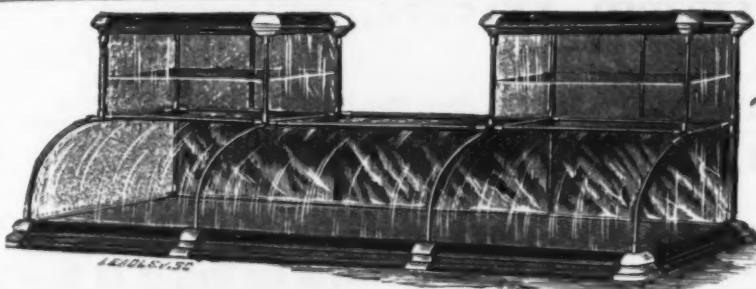
QUALITY EQUAL TO STEEL FORGINGS.

Can be Bent, Welded or Forged.

**STEEL INGOTS,** Best Stock, Furnished to Order.

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**IRON AND STEEL.**  
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Tire, Toe, Sleigh, Machinery, Spring Steel, &c.  
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Manufacturers of **SHOW CASES** of every description. Highly finished wood cases with pat-  
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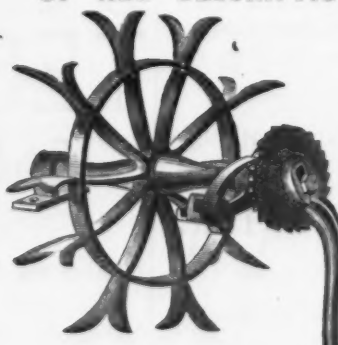


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Manufactured from the celebrated OTIS STEEL BRAND

**STANDARD**  
Quality and efficiency fully guaranteed. Prices as low  
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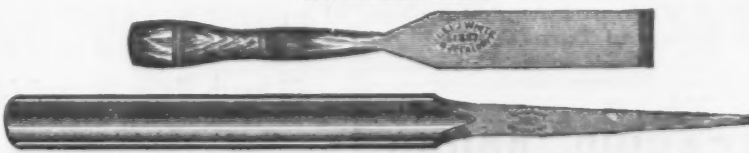
**THE STANDARD STEEL WORKS,**  
WORKS AT LEWISTOWN, PA.  
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**Headquarters FOR Pump Fixtures**  
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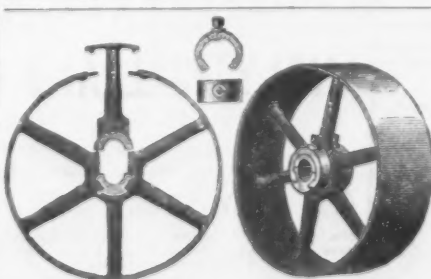
**L. & I. J. WHITE,**

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**EDGE TOOLS & MACHINE KNIVES**  
Coopers', Carpenters' and Ship Tools, Cleavers, &c.  
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310, 312 & 314 EXCHANGE ST.,

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**Cross Divided Pulley.**  
in all sizes, from 6 inches up to 48 inches,  
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**THE ADVANTAGES**  
are numerous and important.

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**WROUGHT IRON**  
**BOILER TUBES.**

Steam, Gas and Water Pipe, Oil  
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Cotton Presses, Forgings, Rolling  
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**Brass, Iron, Steel and German Silver**  
**SCREWS.**  
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ROLLER SKATE!  
We Challenge the World to Produce its Equal.  
Sample Fair sent postpaid on receipt of price.



**SHOT GUN.**

Top-Snap Action, Pistol Grip, Rebounding Lock, Patent  
Fore-end Fastening. For good workmanship, convenience of  
manipulation, hard and close shooting, durability, and beauty  
of finish, this gun has no equal and challenges the world.  
PRICES: Plain Barrel, 12 bore, \$15.00; 10 bore, \$16.00.



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PRICES:  
Cuff, Plain, \$4.75  
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Sent by mail, postpaid, on receipt of price.  
Special catalogue of Police Clubs, Hand Cuffs, Leg Irons,  
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**LOVELL'S** Double  
Action Ejector  
Revolver.  
Price, \$7.50.  
Using 38 S. & W. C. P.  
Cartridges. Sent postpaid on receipt of price.  
Send 6c. in stamps for large catalogue of Police  
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Prices to the trade sent on application.

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Every Pair Warranted  
for One Year and  
No Rattle.

Send for Circular to  
**STILES FROST,**  
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Works at Tyrone Forges, Blair Co., Penn.  
MANUFACTURERS OF  
**BEST CHARCOAL BLOOMS**  
and **BOILER TUBE SKELP.**

ALSO TACK AND NAIL PLATE.

Blooms guaranteed and especially adapted  
for stamped ware.

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Light Castings a Specialty.

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Correspondence solicited.

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**Measuring Tapes**  
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FOR ALL PURPOSES.  
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Blacksmiths' Drills, Butchers'  
Tools, and Feed Cutters.

Write for Catalogue and Prices.

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GENERAL WESTERN AGENTS.

European Agency with SELIG, SONNENTHAL & CO.,  
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BRASS, BRIGHT  
TINNED WIRE  
& JAPANNED**BIRD****CAGES.**The cheapest and  
most saleable in  
market. Catalogues and  
Price Lists furnished  
to the Trade.247 & 249 Pearl St.,  
New York.

No size of Band for Brass and Tinned Wire Cages.

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**W. & B. DOUGLAS,**  
MIDDLETOWN, CONN.,  
The Oldest and Most Extensive Manufacturers of  
**PUMPS, HYDRAULIC RAMS, GARDEN ENGINES.**  
Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill  
Pumps and other Hydraulic Machines in the World.**Wrought Steel Sinks.**

One of the strong points of these sinks is the new coupling with which they are now supplied and which is pronounced by all plumbers the best on the market. It is used with both lead and wrought-iron pipe; is a neat, reliable coupling, and is easily detached for the purpose of pumping out the pipe. The strainer and all parts of the coupling are tinned, and are furnished with all sinks without extra charge.

The fact of the great strength and durability of this sink, as it is practically free from danger of breakage in transportation, handling or use, is a strong point in its favor, and that its merits are recognized by most competent judges is evident from the fact that leading houses which have been interested in the common article have taken up the Wrought Steel Sink. Twenty-five per cent. is saved in freight by purchasing Steel Sinks. Orders come from all parts of the United States, Canada, Europe and Australia.

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85 and 87 JOHN STREET NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

**UNION MANUFACTURING CO.**

Manufacturers of

**SKINNER'S PATENT  
COMBINATION CHUCK.**

Plain and Ornamental Butts,  
Single and Double Acting Spring Hinges,  
Union Coil Door Springs,  
Galvanized Pump Chain,  
Patent Rubber Buckets,  
Wooden Well Curbs, Wood Tubing,  
Iron and Brass Pumps,  
Patent Copper Pumps,  
Hydraulic Rams, Power Pumps,  
&c., &c., &c.

**FIG. 114 REPRESENTS OUR  
Hand Force Pump.**

It is made of brass, is strong and light, and is the best pump of its kind in the market. Write for prices.

**UNION MANUFACTURING CO. New Britain Conn.**

Warehouses, 103 Chambers St., New York., and 164 Lake St., Chicago.

GEORGE BROOKE, President.

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**THE E. & G. BROOKE IRON CO.,  
BIRDSBORO, BERKS CO., PA.,**

MANUFACTURERS OF

**ANCHOR NAILS AND SPIKES. BRAND**

Capacity, 1000 Kegs per Day.

Made from their own Pig Iron, Insuring Regularity and Superiority in Quality.

ALSO

**FOUNDRY AND FORGE PIG IRON,  
AND COLD BLAST CHARCOAL CAR WHEEL IRON.****OLD DOMINION  
CUT NAILS, BAR IRON.****R. E. BLANKENSHIP, President,**

RICHMOND, VA.

**IRON AND STEEL DROP FORGINGS**

All shapes, small and large, including  
GUN, PISTOL, WRENCH BARS, &c. ALSO, DIE SINKING. MANUFACTURERS ALSO  
OF BRICKLAYERS', MOULDERS' AND PLASTERERS' TOOLS,  
SADDLERS' BOUND AND HEAD KNIVES.

**WILLIAM ROSE & BROS.,**

36th &amp; Filbert Sts., WEST PHILADELPHIA.

**NATIONAL HARDWARE & MALLEABLE IRON WORKS,**

Lehigh Avenue, American and Third Streets, Philadelphia.

**THOMAS DEVLIN & CO.,**MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS made from patterns to  
order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line  
of Carriage and Wagon Castings constantly on hand for the trade.**BALL  
BEARING DOOR MANGERS**For House Doors, Car Doors, Elevator Doors.  
Frictionless. Indestructible. Perfect. Send for Circular.**CONHOES IRON FOUNDRY & MACHINE CO., CONHOES, N. Y.****American Institute of Mining  
Engineers.****THE PITTSBURGH MEETING.**

In continuation of the discussion on  
steel, printed in last week's issue, Dr.  
C. B. Dudley, of Altoona, made the follow-  
ing remarks:

The chemistry of iron and steel can only  
be said to be thoroughly understood when  
three things are known: 1. The number  
and kind of chemical elements present.  
2. The amounts of each of these different  
elements. 3. The way in which these  
elements are combined with each other.  
Most of the chemical work hitherto done on  
iron and steel has shown only the first two  
of these requisites. We know what chemical  
elements are present, and the total  
amounts of them, but we do not know what  
combinations of these elements—in short,  
what chemical compounds—are present.  
We offer it simply as a suggestion that  
the difference between the soft steel  
made in the Bessemer converter and that  
made in the Clapp-Griffiths process,  
especially as to its behavior in rolling,  
may be due to a difference in the condition  
of the phosphorus in the two metals. It is  
generally believed that in Bessemer steel the  
phosphorus exists as phosphide of iron.  
And indeed it is claimed by many chemical  
metallurgists that in the ordinary acid Bessemer  
process this is practically the only  
form in which the phosphorus can exist.  
This phosphide of iron is believed to be a  
highly-crystallized body disseminated through  
the mass of metal and interfering with its  
continuity. In the Clapp-Griffiths process,  
on the other hand, it is possible—and many  
of the conditions and circumstances in carry-  
ing out this process would seem to favor this  
view—that the phosphorus may exist in the  
form of phosphate of iron, or the phosphide  
may have been oxidized. This phosphate of  
iron is believed to be a common constituent of  
wrought iron, and, in fact, may be regarded  
as a species of slag disseminated through the  
metal. It is almost universally believed, we  
think, that phosphorus is a much less objec-  
tionable constituent of wrought iron than of  
steel, and, as said above, we simply offer the  
suggestion that this may be due to the con-  
dition in which the phosphorus exists, and  
that this same explanation may account for  
the remarkable difference said to manifest  
itself in the behavior both during manufac-  
ture and in the metal during its subsequent  
working.

Mr. E. Ford, chemist at the Edgar Thom-  
son Works, spoke as follows on the subject:

Mr. President: Dr. Dudley's remarks on  
certain probable combination of the metal-  
loids and the metals in pig irons and steels  
recalls very forcibly to my mind some ex-  
periments which I made some seven or  
eight years ago on the chilling properties of  
cold-blast irons and the wearing properties  
of chilled cast-iron car-wheels. At that  
time I was chemist of a large car-wheel  
foundry, and we were endeavoring to dis-  
cover why one iron would give a good, hard  
chill, and another iron, although chilling,  
yet the chill would be soft and good for nothing;  
and furthermore, why one wheel would  
make a mileage of 10,000 miles, and yet an-  
other 100,000 miles. During my experi-  
ments I found that two elements played the  
most important part in the chilling of irons  
and in the wearing property of chilled  
wheels. And these two elements were  
silicon and carbon; consequently, I watched  
the action of these two elements more  
closely than any of the others. It was my  
good fortune to obtain a number of old car-  
wheels which had records of different mil-  
age. I obtained one which had only made  
10,000 miles, and others that had made their  
40,000, 50,000, 60,000, 70,000, and two that  
had made over 100,000 miles. The wheel  
that gave the least service and the wheel  
that gave the largest amount of service  
were found to contain almost identically the  
same amounts of both silicon and carbon.

It was in the chills of these two wheels  
that I discovered what I am convinced is a  
combination of silicon with carbon, and this  
combination of silicon and carbon was  
greater in the wheel that had made the  
longest mileage. This fact I also found  
whenever I tested a wheel that had made  
good service; this peculiar combination was  
always present in large quantities. As to  
how to obtain this silicon, the best way I  
found was to crush the chilled iron as fine as  
possible, dissolve in hydrochloric acid of  
1.06 specific gravity, and during solution pass  
a stream of carbonic-acid gas through the  
flask to prevent oxidation. After boiling for  
about an hour, the iron having been dis-  
solved, there will be seen in the flask all  
through the solution small particles which  
would be taken for flocculent silicon, but of  
a slightly yellowish color. On filtering this  
solution and washing this apparent floccu-  
lent silicon with dilute hydrochloric acid to  
get rid of the iron, and then pouring on the  
filter a hot potash solution of the strength  
of 1.25 specific gravity, there will now be  
observed to be a strong effervescence and  
hydrogen will be given off in large quanti-  
ties. This apparent silicon will be dissolved  
and pass through the filter in solution with  
the potash; in the filter will remain a black  
mass which resembles black varnish more  
than anything else I can compare it to.  
Now these facts were not once obtained, but  
repeatedly, and I always found that those  
wheels that had made the largest mileage  
invariably contained a large amount of this  
form of silicon, while those wheels that had  
made a small mileage contained very small  
quantities of this same silicon.

Further, wishing to use some cheaper irons  
than the coal-blast charcoal irons, and at the  
same time irons that would give as good  
wearing chill as the cold blast irons, I,  
through the kindness of Captain Jones, of  
the Edgar Thomson Steel Works, was al-  
lowed to take tests of the heats in the Bessemer  
converter at different stages of the blow.

My first test was made of the cupola iron  
as it ran into the converter. I then blew the  
heat about three and a half minutes, turned  
down and took a small test. This test on  
being broken open was found to be fair gray  
iron. These two irons, the test of the cu-

pola iron and the iron that had been blown  
three and a half minutes, were the next day  
melted in crucibles, and we made what is  
known as "chill tests" of them—that is, a small  
mold was made with three sides of sand and  
the fourth side of iron. The test pieces were  
about 6 inches long and about 2 inches by 1/2  
inch. On breaking these tests the cupola  
metal was not chilled at all, while the par-  
tially Bessemerized metal was found to be  
chilled for over an inch in depth. On test-  
ing this chill for this peculiar form of silicon  
I found that it contained it in large quanti-  
ties. We therefore determined to make  
car-wheels of this partially Bessemerized  
metal and see how they would wear. We  
made the wheels and put them into service.  
The last that I heard of them was about two  
years ago, when they had made their  
250,000 miles, and the report was that they  
were not worn out yet.

Now, I think from this report of the good  
service of these wheels that it certainly shows  
that this insoluble form of silicon plays a  
very important part in the wearing prop-  
erties of chilled car-wheels. Another very  
curious fact, which seem to show that the  
carbon exists in these chilling irons in some  
different form than in which it exists in the  
hot-blast or non-chilling irons, can be  
proved by dissolving some of the boring  
of a chilling iron in strong hydrochloric  
acid, evaporating to dryness and heating un-  
til the chloride of iron is all decomposed, then  
redissolving in hydrochloric acid, filtering  
and washing residue free from iron. Now  
if we pour on the filter a hot solution of  
potash of the same strength as before men-  
tioned, viz., 1.25 specific gravity, we will  
obtain a filtrate which will be colored ac-  
cording to the depth of the chill which the  
iron will take if it be melted and poured  
against a chilling surface. The deeper the  
color the greater the chill. By this test I  
was able to predict how deep a chill an iron  
would give before it was used. I think this  
certainly proves that silicon and carbon do  
exist in forms which exert great influence  
on certain properties of cast iron, and, if  
they do in pig iron, why should they not in  
steel?

At the close of the discussion Prof. Wm.  
F. Blake, of New Haven, read an interesting  
paper on "The Iron Deposits of Utah."

Mr. Geo. W. Maynard supplemented  
Professor Blake's paper with a verbal state-  
ment as to the character of the iron ores and  
coals and cokes referred to. The analysis of  
the ores as to the constituents of metallic  
iron and phosphorus iron are as follows:

	Metallic iron.	Phos- phorus.
Armstrong	63.925	0.226
Adams	58.675	0.314
Smith (Eastside)	59.925	0.032
Smith (Westside)	61.425	0.265

**Analyses of coals:**

	Cedar City.	Castle- dale.
Water at 212° F.	3.508	3.436
Volatile matter	43.063	42.814
Fixed carbon	48.102	47.810
Sulphur	9.727	5.960
Total	100.000	100.000

Coke

52.885 53.760

Color ash

Pink Reddish  
gray gray.

The Cedar City coal was quite coherent  
and hard; the Castledale much less coherent.  
The analysis of Cedar City coke was as fol-  
lows:

Water and volatile matter	1.417
Fixed carbon	76.106
Sulphur	5.327
Ash	16.507

This Mr. Maynard regarded as a worthless  
fuel, first, because of the large amount of  
ash it contains, and, second, because of the  
excessive percentage of sulphur.

Dr. R. W. Raymond followed with an  
interesting paper on "The Ives Photo-  
engraving Process and Its Usefulness to  
Engineers."

The next was an exhaustive paper on

CORNWALL IRON ORE MINES, CORNWALL,  
LEBANON COUNTY, PA.

by E. V. d'Inville, Philadelphia, Pa.:

**Location.**—The magnetic ore mines of  
Cornwall are situated on the south margin of  
the Great Valley, 5 miles south of Lebanon,  
and about midway between Reading on the  
Schuylkill and Harrisburg on the Susque-  
hanna rivers, in three prominent contiguous  
hills, standing in front of the mesozoic red  
shale and sandstone hill country of Northern  
Lancaster and Southern Lebanon counties,  
and overlooking the great limestone plain to  
the north.

The three hills, named respectively Big,  
Middle and Grassy hills, and separated from  
each other by two branches of Furnace  
Creek, range in a nearly east and west di-  
rection for a distance of about 1 mile. The  
elevations of their summits are respectively  
870, 715 and 700 feet above tide, and that of  
the railroad line opposite the base of Middle  
Hill 575 feet at Cornwall and 471 at Leb-  
anon. When first mined in the last century  
these hills exhibited smoothly-rounded sur-  
faces composed of soft weathered ore of  
great purity, beneath which lay the great  
mass of hard ore, constituting the whole  
body of each hill, now extensively removed  
by quarrying down to the water level of  
Furnace Creek. But the quantity of ore  
still remaining above water level is much  
greater than that removed, and in several  
places the original surface is still untouched,  
while beneath water level the ore is known  
(by borings) to descend to a depth exceeding  
300 feet.

The extreme length of the uncovered ore  
deposit is about 400 feet; its breadth in  
Big Hill about 400 feet, in Middle Hill 800  
feet, and in Grassy Hill 600 feet, and its  
total area is estimated at nearly 63 acres.  
The north and west brow of Grassy Hill,  
the north brow of Middle Hill, and the  
north, east and south brows of Big Hill, are an  
outcrop of dolerite trap. The sloping trap  
dyke is exposed on the opposite side of each  
of the two gaps, descending from the hill-  
tops to water level, with an apparent width  
of about 100 feet. Beneath water level the  
trap dyke is, of course, continuous from the  
east end of Big Hill to the west end of  
Grassy Hill, when, bending toward the  
southwest, it disappears beneath the mesozoic  
rocks.

The ore mass lies against the south slop-  
ing face of trap, therefore overlying and  
abutting against it. The rocks immediately

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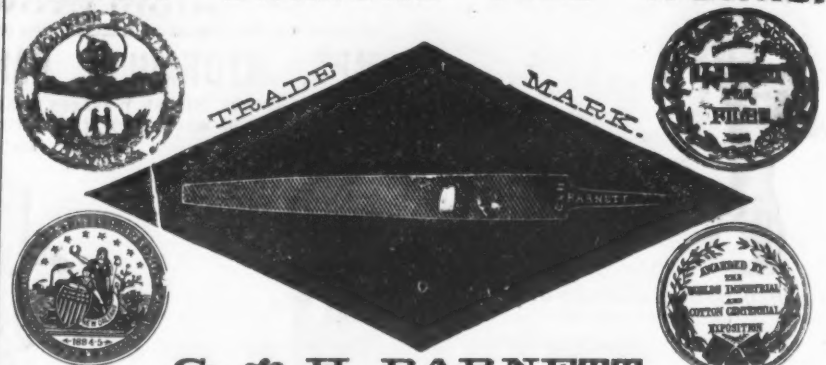
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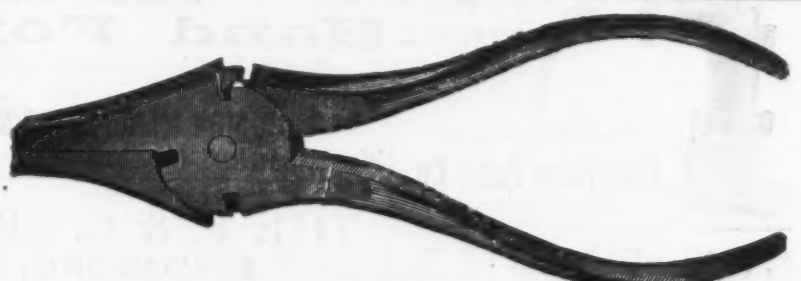
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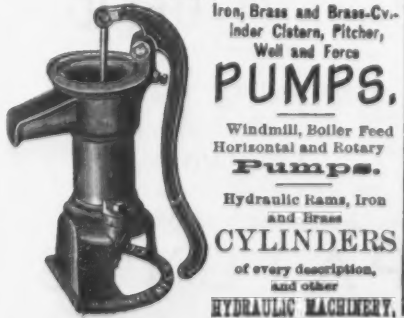
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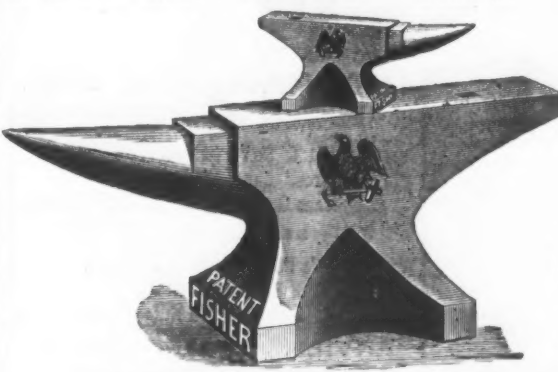
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north of the bounding wall on the hill slopes are hidden by a mass of broken fragments of trap, so that very little is known of their character or position. The edge of the ore mass is by no means a straight line, but follows the irregular course of the trap, which changes several times in a very abrupt manner.

The function of the trap has been eminently a preservative one, its hard rock resisting the general erosion of the whole region and preserving a portion of the ore mass above water level, which otherwise would have been most probably swept away long ere this. It is not to be supposed that the trap had anything to do with furnishing the ore mass with its iron, for deposits of similar ore exist elsewhere through this range, not apparently connected with trap in any way. Part of the trap has gone; how much cannot be known. Part of the ore has likewise gone, and probably a greater portion than has been preserved.

2. The Cornwall Ore Mass.—The Cornwall ore mass is evidently a regularly stratified formation sloping down southwestward against the edge of the mesozoic rocks, and rising northeastward into the air, where it is worn off on the top of Big Hill. As a consequence of this any particular stratum on the summit of Big Hill will be (topographically) very much lower in Middle or Grassy hills, the amount of difference in elevation depending entirely upon the dip. And this may account for the great depth of ore (upward of 325 feet thick) found at Bore Hole No. 4, in Middle Hill. This stratified formation has been in some manner converted into ore, retaining its place and form in all essential particulars.

Whatever this process was, its effects at Cornwall are precisely like its effects at the Wheatfield Island Mine, at Reading, and the Boyertown magnetic ore mines in Berks County, and the great brown hematite mines in Center County and elsewhere.\*

What first strikes the observer in entering these mines through the valley of Furnace Creek is the unusual depth of the deposit still remaining above water level, the terraces of Big and Middle hills being very impressive. The water plane of the mine is about 570 feet A. T., the slopes or terraces rising from this.

In Big Hill the slopes are respectively 40, 120, 50 and 70 feet, measured from below upward, the highest point of ore, the present summit of Big Hill, being 300 feet above the water plane between Big and Middle hills.

In Middle Hill the first slope rises from the water plane 80 feet, with a length of 500 feet measured along its top edge from the trap wall to the entrance of the great Water Level Cut, which is designed to penetrate westward to Grassy Hill. The first terrace is 200 feet wide to the base of the second slope, which is 6 feet high. The second terrace is 30 feet wide to the third slope, which is 38 feet high, to the original hill top. Middle Hill has been worked back westward from the creek, 450 feet to the foot of the first slope.

In November, 1885, the Water Level Cut before mentioned had extended this distance to 600 feet, the height of the ore being then 60 feet in this cut.

The depth of the ore mass beneath the water plane near the creek was tested by three bore holes, No. 1 being furthest north and within 140 feet of the trap, which it struck at a depth (all ore) of 134 feet.

No. 2 is 100 feet from the last, and struck the trap at 179 feet. No. 3 is 275 feet further south, and met the trap at 238 feet.†

All three holes were started upon the same level and went through the same stratification of ore.

Bore Hole No. 4, 1440 feet south 76° west of No. 3, 150 feet from the edge of the mesozoic red shale, and at a level of 617 feet A. T., went down 325 feet, entirely in excellent ore, and without reaching the trap.

In the Big Hill deposit the mass probably shallows up, for it is completely surrounded by trap; but the depth of ore still remaining beneath the terraces is unknown, although Bore Hole No. 5 was once sunk to determine the point, without success.

Ore in Big Hill.—From the Ore Bank Co.'s railroad bridge crossing the pike, east of the weighhouse, to the eastern wall of trap rock the ore deposit is about 1,400 feet long and will average about 400 feet in width.

The top level or terrace is 800 feet A. T., and is about 700 x 400 feet.

The south side is pretty generally worked down to an 800-foot level, very irregular along the trap wall, owing to the shoulders which protrude out into the ore mass.

The north side of this terrace consists almost entirely of the soft reddish-brown surface ore, 500 x 200 feet in area and probably 50 feet thick. This ore is, of course, readily mined, owing to its soft character, much of it being dug with pick and shovel. Considerable black and brown mica and some hornblende are mixed with this ore here.

In the second level, just below the one described, tongues of trap are quite prevalent, especially near the north wall, dividing a 50-foot face of ore into four or five parts. These divisions, however, are by no means absolute, varying considerably in thickness and prominence. On the south side the ore is rather lean, and contains large masses of the greenish soapy gangue rock, mostly a double silicate of lime and magnesia. Mr. A. S. McCreath has kindly furnished me with the following analysis of this material (No. 1), which he calls "a greenish white mineral associated with Cornwall ore," and in addition an analysis for comparison of No. 2, same material, found in Dillsburg ore:

	1, Cornwall.	2, Dillsburg.
SiO <sub>2</sub> .....	52.11	49.09
FeO.....	10.74	5.78
Al <sub>2</sub> O <sub>3</sub> .....	1.90	5.57
CaO.....	18.54	22.55
MgO.....	17.89	18.02
H <sub>2</sub> O, combined.....	2.03	1.30
CO <sub>2</sub> .....	none	none

A third analysis—No. 3—of the limestone foot wall and associated rock at Dillsburg is even more conclusive of the fact that the carbonates of lime and magnesia originally

\* See Reports D 3, Vol. II, and T 4, Geological Survey of Pennsylvania.  
† This bore hole went down 2 feet further into trap and was then abandoned.

present in the gangue rock have yielded to solution and left as a residue the greenish silicates of those bases:

No. 3 Dillsburg Limestone.			
SiO <sub>2</sub> .....	14.70	MgO.....	8.57
FeO.....	1.33	H <sub>2</sub> O, combined.....	.95
Al <sub>2</sub> O <sub>3</sub> .....	2.99	CO <sub>2</sub> .....	30.51
CaO.....	44.90		

"To fully saturate all the CaO and MgO of the limestone and convert them into carbonates would require 39.20 per cent. carbonic acid. The CO<sub>2</sub> present falls far short of this—showing that part of the CaO and MgO must exist as silicates."

I do not doubt that analyses of the limestone and gangue rock at the Reading, Fritztown, Boyertown and other mines similarly situated along the southern border of the Great Valley would show precisely similar results.\*

The third level in Big Hill is about 650 feet A. T. The high slope rises from here 120 feet. The exposure of this immense face of ore is magnificent. Along the north side of the face the deposit is somewhat silicious and shows some small trap prongs, but the general appearance of the whole slope is very favorable; the ore is very hard. Shipments from this level vary from 1000 to 1500 cars per month and the work of the drill from 80 feet to 150 feet per day.

The fourth level is about 40 feet below the last, or 605 feet A. T. No active mining is done here at present. The wavy stratification of the ore and lime slate is well seen here. From the level to Furnace Creek is about 40 feet, all ore ground, but preserved or railroad tracks, roads, &c.

Ore in Middle Hill.—The general appearance of the entire deposit in this hill is most excellent, and the company regard it as the great future supply store, both from the increased width of the deposit here and the testimony of the bore holes for the amount of ore beneath water level. Very little soft surface ore remains here, being roughly confined to the 670 feet contour line, and is fast disappearing under the demand for it. All this ore has the property of "roasting itself"—that is, eliminating a large percentage of its sulphur, when exposed to atmospheric influences for about two years, through a vertical thickness of about 10 feet.

The characteristic features of the entire Cornwall deposit can be best studied on this hill, every variety of ore and gangue rock being prominently exposed.

The deepest and least weathered ore is exposed in the water-level drift, but so far no appreciable increase in the percentage of iron pyrites has been met with here over the hard ore on the upper terraces, and this statement is equally true of samples taken from considerable depths beneath water surface in the bore holes.

About 300 feet in the cut there is a barren spot of bastard slaty limestone, in the form of a wedge or lenticular nodule of gangue, separating the richer deposits of ore on either side of it.

Beyond this (further west) the face shows successive streaks of ore and limestone from 2 to 6 feet thick, suggesting the original richness and leanness of the pyritiferous lime shales, and a precise analogy of what I have seen at the Boyertown mines.

Milky quartz also occurred here in a lenticular-shaped pocket, 2 feet wide in the center and tapering down at the ends, and about 2 feet long, interbedded entirely in ore.

A most curious quartz conglomerate, containing pebbles of white and pink quartz from the size of a pea to that of a large marble, accompanied with feldspar, and having a greenish cast, occurs between the 650 feet and 670 feet contours, and, according to the superintendent, in masses weighing from a ton down, but always surrounded by ore, and without any definite arrangement. This will be referred to later in this paper.

Copper in Middle Hill.—On both sides of the hill, along the limestone ridge and knobs shown on the map, numerous small drifts mark the former explorations for copper. This metal has been found in the native state as carbonate and red oxide, but chiefly as sulphide. Its occurrence is marked by great irregularity and in thin veins, which, traced downward, always change into the double sulphide of copper and iron, and in time into iron pyrites entirely. This change usually takes place in a vertical distance of 30 to 40 feet.

Ore in Grassy Hill.—On Grassy Hill, owing to the cessation of active mining operations until the advent of the Water Level Cut thus far west, very little of interest can be seen. No break in the southwestward extension of the ore deposit from Middle Hill across the branch of Furnace Creek is apparent.

The general appearance of the ore mass is uninviting now, owing to the presence of much wash material and a large mass of decomposed slaty limestone clay, which covers more than one-half the area of the present excavation, extending from the railroad track south to the red sand wash. A considerable amount of red hematite was mined from this part of the hill, while to the north and west, adjacent to the trap wall, the greenish-black magnetic ore, slate and shoulders of trap—such common features elsewhere—are repeated in this hill. The ore has been mined for about 70 feet from the top of the hill.

No bore holes have been drilled here; and the idea that the ore deposit shelves up southwestward here, as it does northeastward in Big Hill, has no foundation in fact, and the only reason that can be assigned for it is that the west trap wall slants eastward in a steep and irregular manner.

The Stratification of the Ore Deposit.—The second most striking feature to the eye of the observer standing in the valley of Furnace Creek is the universal, regular and apparently horizontal stratification of the whole deposit, exhibited along the faces of the slopes.

It is evident that this stratification is original to the formation, and antedates its conversion into ore, or at least antedates the development of its present characteristic mineralogical features; for the whole mass consists of thick and thin beds deposited

\* See analyses of Warwick Mine limestone, D 3, Vol. II, p. 22.



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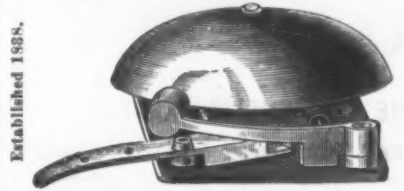
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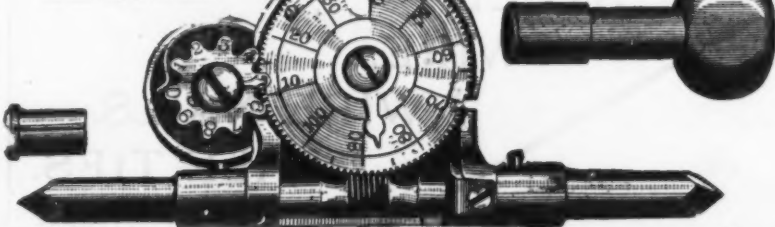
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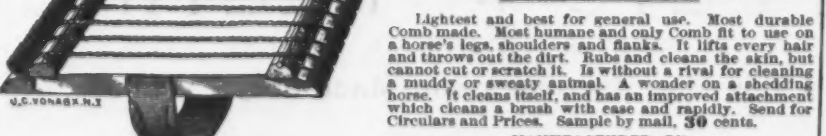
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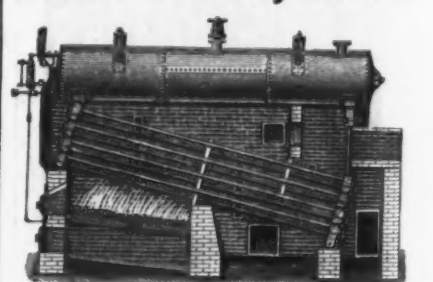
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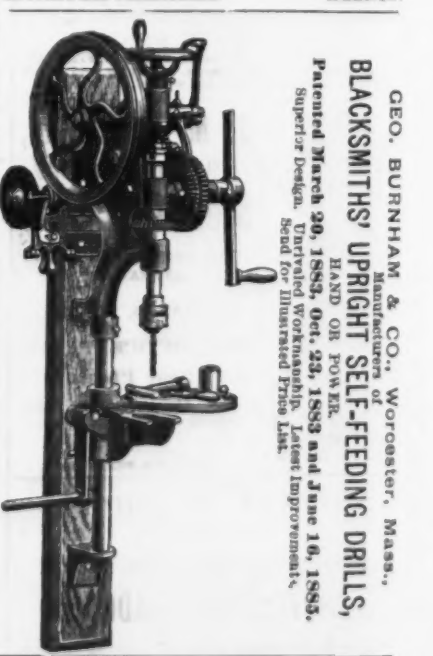


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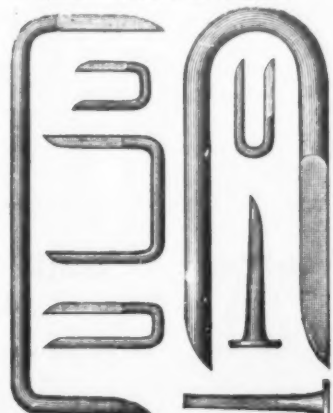


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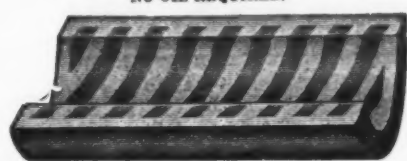
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one upon another, as in the case of unchanged sedimentary strata, in a practically horizontal order.

But when this stratification is viewed sideways, in the side slopes, and especially in the Great Water Level Cut through Middle Hill, a general dip of the ore beds toward the southwest, in almost all parts of the mine, is plainly discerned. The southwest dip, from Big Hill on the east, through Middle Hill to Grassy Hill on the west, amounts to about 5°, sometimes less, sometimes as high as 10°.

Along the south side of Middle Hill, where the limestone beds appear, there is some departure from the general direction and strength of dip, which can be, perhaps, accounted for by a general settling of the whole ore formation during the process of change from its original condition of sedimentary lime-shale beds to its present state of a stratified ore mass, to which change of character and position the undissolved limestone beds would only partially conform.

The situation of the ore mass in the great limestone valley, and surrounded on three sides by a formation of lime shales, would render it probable that it was originally a formation of lime shales containing more or less magnesia, silica, alumina and iron pyrites; this probability is increased by the laminated stratification; and is made fairly certain by the fact that a considerable thickness of unchanged lime-shale layers, passing upward into solid beds of hard limestone, blue, white and semi-crystalline, are exposed along the southern side of Middle Hill in the body of the ore mass, which has been mined on both sides of them, beneath and above them. These unchanged lime-shale beds are seen at one place resting upon the ore, and at another place the limestone beds dip under the ore layers at the same angle, changing gradually, both longitudinally and vertically, into ore.

In addition to these facts there occurs on the 650-foot terrace the remarkable exposure of sandstone and conglomerate, already referred to, which must be regarded as interstratified with the ore mass. This rock extended through a range of 10 feet of the ore vertically, 100 feet long and 20 feet wide. But so far it has not been met with elsewhere in the mines. They must be parts of the original stratification of the ore mass, for fully 50 feet of ore has been quarried from their surfaces. Two of these blocks still stick up out of the wide terrace, awaiting the westward advance of mining development to dislodge them. They could get into the ore deposit in no known way, and no rocks in the neighborhood bear any resemblance to them.

The Chemical Constitution of the Cornwall Ore.—The first complete analysis of Cornwall ore made by Mr. A. S. McCreath for the Geological Survey of Pennsylvania, shows its chemical constitution well, but hardly its percentage of iron, unless taken with his later analyses of samples gathered by himself in August, 1881. This first analysis is No. 1 Cornwall "white ore," from the east face of Middle :

	Per cent.
Bisulphide of iron.....	8.431
Peroxide of iron.....	51.832
Sesquioxide of iron.....	0.371
Trioxide of manganese.....	0.490
Oxide of cobalt.....	1.472
Sulphide of copper.....	2.969
Alumina.....	2.510
Lime.....	7.917
Magnesia.....	0.534
Sulphuric acid.....	0.054
Phosphoric acid.....	none
Carbonic acid.....	1.130
Water.....	19.750
Alkalies and undetermined.....	99.454
Silica.....	33.400

At the office of the company at the mines, six blocks of ore, each intended to be a cubic foot in dimension, have been dressed and placed in two columns of three each on each side of the superintendent's office door. These blocks were designed to show any grade of ore occurring in the mines, and, after being dressed and weighed, borings were taken from them for analysis. The following table shows their weight and percentage:

	Per ct. iron.
First block weighing 224 lbs., 1st grade.....	62
Second block, weighing 257 lbs., 2d grade.....	57
Third block, weighing 257 lbs., 3d grade.....	55
Fourth block, weighing 228 lbs., 3d grade.....	44
Fifth block, weighing 231 lbs., 3d grade.....	42
Sixth block, weighing 190 lbs., 4th grade.....	24

Under this arrangement of grading, which is purely a chemical and not a commercial one, Mr. McCreath's analysis of No. 1 sample just given would fall under the head of the third grade nearly.

The following analyses by Mr. McCreath are arranged in the order of their percentages of metallic iron, to show the chemical constitution of the different grades of ore. For this suggestive arrangement I am indebted to Professor Lesley, of the Geological Survey:

Cornwall ore.	Analysis No. 2.	Analysis No. 3.	Analysis No. 4.	Analysis No. 5.	Analysis No. 6.	Analysis No. 7.	Analysis No. 8.
Metallic iron.....	64.900	57.050	51.450	51.050	48.800	46.400	41.900
Metallic manganese.....	0.158	0.064	0.072	0.115	0.057	0.238	0.194
Metallic copper.....	0.005	0.447	0.559	0.295	0.599	0.066	0.319
Alumina.....	0.324	1.394	1.080	1.289	2.315	7.815	4.970
Lime.....	1.010	2.740	2.600	2.340	4.330	2.550	2.810
Magnesia.....	1.131	3.942	6.652	6.616	5.531	2.738	7.459
Sulphur.....	0.071	2.531	2.459	3.271	1.807	0.050	0.428
Phosphorus.....	0.014	0.007	0.010	0.010	0.018	0.023	0.019
Silica.....	3.980	8.650	12.270	11.560	12.940	18.040	20.910
Phosphorus in 100 parts of iron.....	0.021	0.012	0.019	0.019	0.036	0.049	0.045

No. 2. Sample of 115 pieces of "Nigger-head ore" from Middle Hill.

No. 3. Sample of "No. 3 ore" from east face of Middle Hill.

No. 4. Sample of fine or soft ore, "No. 3 ore," from west cut, north side of Middle Hill.

No. 5. Sample of fine or soft "No. 3 ore" from west cut, south side of Middle Hill.

No. 6. Sample of "No. 1 ore," east face of Middle Hill.

No. 7. Sample of fix or wash ore, from near engine-house, south base of Big Hill.

No. 8. Sample of No. 1 light ore from west cut, south side of Middle Hill.

All samples were dried, previous to analysis, at 212° F.

A comparison of these analyses establishes the important fact that the ore is not a mixture of iron and magnesia, but a single ore, the iron being exactly 1 cubic foot, but it was impossible to get the 44 per cent. block weighing less than the 43 per cent. block.

richness of the ore depends upon the percentage of silica in combination with its three bases—alumina, lime and magnesia—not in equal quantities, but in varying proportions of the three. This will be made clearer perhaps by the following summary, which deal only in round numbers:

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)
Iron.....	65	57	51	51	49	46	41	39	35
Silica.....	4	8	12	12	13	18	21	21	30
Alumina.....	2	1	1	1	1	1	1	1	1
Lime.....	1	1	1	1	1	1	1	1	1
Magnesia.....	1	1	1	1	1	1	1	1	1

This is additional proof of the existence of insoluble silicates in the Cornwall ore gangue rock, before referred to. It is also additional evidence of stratification,\* the silicates being in the form of a felspar mud, charged in places with fine quartz sand, the rest of the lime and magnesia being carried off as carbonates in solution by carbonic-acid waters, potash and soda being entirely absent, and phosphorus in no case reaching 1 per cent.

Sulphur is an important, constant, but very variable, constituent of the Cornwall ore, although so generally distributed through the ore mass that the average amount of it in any one ton must be very nearly equal for all parts of the ore mass (except, of course, in the weathered surface ore exposed for a long time to the leaching of atmospheric waters).

This fine surface ore is the commercial "No. 1 ore" of the Cornwall Ore Bank Co.'s grading, yielding 50 to 55 per cent. iron, and being only used to a limited extent as a mixture for fixing puddling furnaces, &c. The "run of mine" No. 2 ore, mostly a fine or small lump ore, carries from 42 to 50 per cent. of iron and from 2.5 to 3 per cent. of sulphur. The "select ore" No. 3 forms the largest part of the output, is mostly lump ore, with about 48 per cent. iron and the same amount of sulphur as the No. 2.

No. 1 is not roasted, but it is only a small part of the general output. All No. 2 and No. 3 ores are roasted. The following analyses of roasted Cornwall ore, made in April, 1880, were furnished by Mr. Arthur Brock, of the North Lebanon Furnaces:

	(1)	(2)	(3)	(4)	(5)	(6)
Iron.....	57.85	56.78	55.90	55.43	55.35	54.32
Silica.....	9.50	10.70	11.85	11.68	11.01	11.30
Alumina.....	3.65	4.30	3.90	3.24	4.21	3.70
Lime.....	2.12	2.40	2.30	2.06	2.32	2.73
Magnesia.....	3.76	4.13	3.62	3.47	4.00	4.31
Sulphur.....	0.45	0.40	0.97	0.42	0.50	0.85
Copper.....						

Those in brackets [ ] are sulphuric acid.

If the silicate bases be taken together we have:

Alumina.....	9.53	11.03	9.62	8.77	10.53	10.74
Lime.....						
Magnesia.....						

The Cornwall ore has been found very well adapted as a neutralizer for most of the hematites of the Great Valley and the fossil ores of Central Pennsylvania when roasted to 1 per cent. or less of sulphur. The magnesia in the ore makes good company for most of the dry limonites of the valley, working a hot cinder, and cleaning without scouring the crucible and fore-hearth.

Associated always with a greenish slate, namely, the silicates of lime and magnesia, the color of the ore is not the intense black of the magnetites of the New York and New Jersey azoic rocks, to which it bears but a very slight physical relation.

Magnetic Quality of the Cornwall Ore.—It may be safely concluded that the Cornwall-ore deposit has experienced three stages of development, being originally a formation of (pyritiferous) lime shales; then a great brown hematite formation, and finally a magnetic-ore deposit, always retaining its original place and general stratification, but becoming consolidated by the loss of most of its lime and magnesia, all of its water of crystallization and part of its oxygen, and greatly reduced in bulk without the loss of its original grains of sand (such as are very visible in the brown hematite ores), and with a concentration of its percentage of iron.

What the original percentage of iron was is open to conjecture. In some brown hematite mines the beds change to carbonate of iron below drainage level; in others, especially the pipe ores of the Nittany Valley, in Central Pennsylvania, I have seen cores of sulphuret of iron left unchanged in the center of the limonite masses. It is, however, difficult to ascribe the production of the magnetic-ore mass to the dissolving action of cool, running water on the lime shales, which is all that is required to produce the brown hematite deposits.

But at Cornwall, Wheatfield, Reading, Boyertown and Dillsburg, the five chief localities in Pennsylvania where this character of ore has been found, trap dykes are always present in the general border range of the mesozoic formation. It is quite possible, therefore, to account for the magnetic stage of development in these ores by the resulting action of heat, either directly

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\* See Annual Report for 1885, Geological Survey of Pennsylvania. J. F. Lesley.



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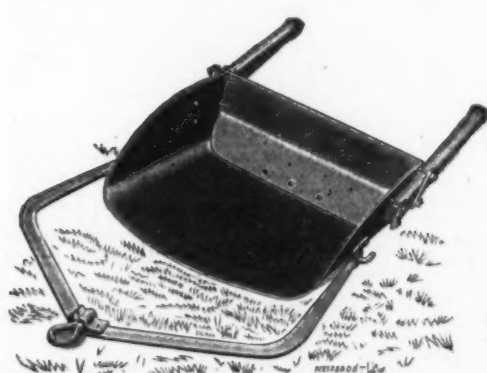
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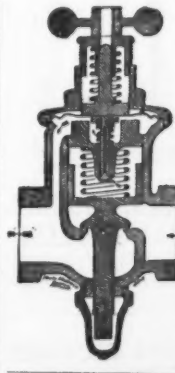
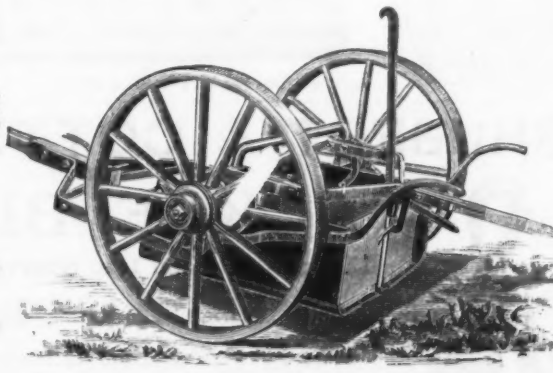
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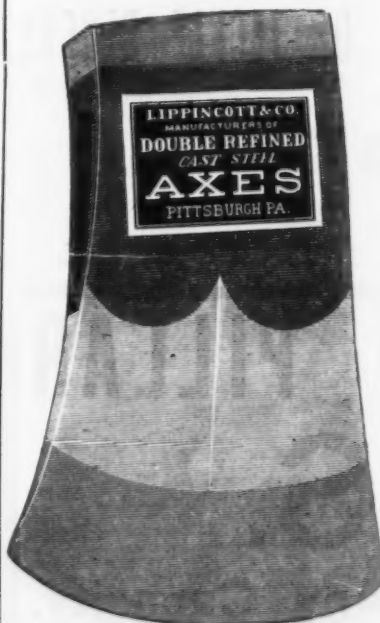
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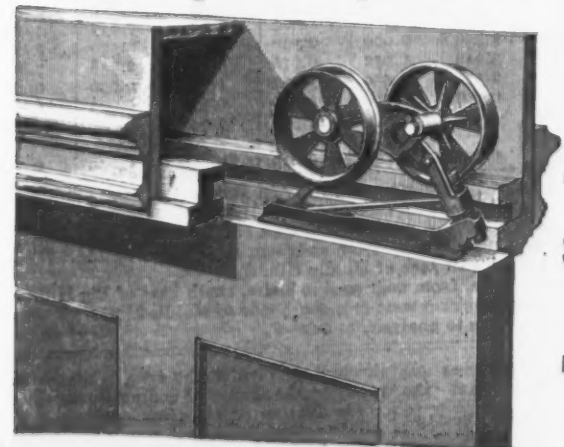
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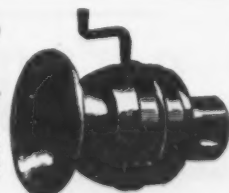


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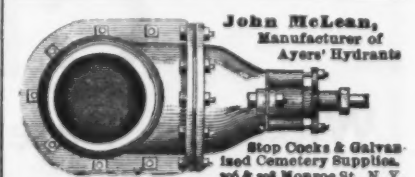
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Cornwall was carried on under the present system of quarrying stone or loose rock. Each individual shareholder in the ore bank raised ore from his own "mine-hole," loading at first directly into wagons that were driven into the banks on the top of the hills, and, when that method was superseded by the advent of a railroad in 1853, tracks were laid, upon which the cars were switched to the various "holes." This systemless method of mining, which allowed no means for determining the amount of ore taken by any one individual owner, led to endless trouble and litigation. Many interesting facts were elicited by the testimony of witnesses in the lawsuits which followed relating to the methods and costs of mining and the character of the ore, all of which are now a matter of court record.

A. Wilhelm, in charge at that time of the interests of R. & W. Coleman, two of the owners, testified that the average cost of mining between the years 1851-59, including mining, powder, master miner's salary and loading on wagons or cars, was 16.28 cents per ton. Chas. B. Forney, the manager of the G. D. Coleman or North Lebanon Furnaces, testified to making a ton of iron from 2.23 tons of ore and 2.55 tons of coal (anthracite). In 14 years, from 1845 to 1859, the average ore per ton of iron was 2.14 tons; coal, 2.47 tons, and limestone 1.400 pounds. Cost, total, \$11.17.

J. Taylor Boyd, then superintendent of the R. & G. D. Coleman interests, now general superintendent of the Cornwall Ore Bank Co., a fellow-member of the Institute, and one to whom much of the credit of this paper is due, put the average cost of mining their portion of the hills between 1853 and 1859 at 30.62 cents per ton, including all expenses connected with mining, superintendence, making sales, &c., but exclusive of commissions. The lowest cost per ton was 22 cents; but the actual cost of mining alone between 1852 and 1859 (see Table 2) varied between 11.04 cents and 22 cents. In 1852 mining proper began at Cornwall, and the first sale of ore was made. Four years before, in 1848, there were seven charcoal furnaces within a radius of 20 miles of Cornwall, each averaging about 1000-1200 tons of pig iron a year. Extracts from two tables are presented below, which sharply reflect the condition of the iron industry at this period of Cornwall, and, while they are only partly germane, seem, nevertheless, to need no apology for their introduction, on account of their historical interest. Both are taken from the court records and were compiled (No. 1) by Mr. C. B. Forney and (No. 2) by Mr. J. Taylor Boyd. The first table is based upon materials delivered to the North Lebanon Furnaces, on the Union Canal, north of Lebanon:

Table 1.—Pig Iron at North Lebanon Furnaces Between the Years 1848-58.

Year.	Cost of furnace.	Net price of iron at furnace.	Iron made.	Cost of ore.
1848	\$13.63	\$19.46	7,132 4	\$1.11
1849	14.14	18.11	6,847 15	1.51
1850	16.23	15.70	4,450 11	2.31
1851	19.32	16.46	4,501 17	1.86
1852	23.00	16.80	2,199 11	1.83
1853	15.60	20.37	6,467 4	1.73
1854	17.70	27.34	7,237 6	1.82
1855	30.61	19.41	1,835 15	1.85
1856	16.17	30.77	7,157 0	1.41
1857	22.33	21.48	4,129 10	1.25
1858	16.59	14.24	5,086 0	1.80
Average cost.	\$18.73	\$19.62	5,328 10	\$1.63

Table 2.—Cost of Mining Ore at Cornwall Ore Mines, &c.

Year.	Average price sold per ton at the mine.	Number of tons mined and shipped.	Average cost of mining per ton.	Average number of men worked.	Daily wages.	Average amount mined and shipped per man per day.
1852	70.81	17,134.08	14.06	15	60	4
1853	76.35	57,025.15	11.04	30	60	6
1854	79.60	63,655.90	19.56	35	77	5.9
1855	95.57	39,007.09	17.04	25	77	4.3
1856	102.78	82,851.02	20.08	50	100	5.2
1857	102.57	73,406.03	21.02	46	100	5.1
1858	99.07	37,416.08	22.00	39	90	4.6
1859	228.00	105,405.00	23.66	90	156	5.9
1860	215.08	109,540.15	28.70	70	157	5.14

The apparent folly of a "free for all" system of mining must have been made apparent to the parties interested, for in 1854 the Cornwall Ore Bank Co. was formed, and Mr. Boyd, the present incumbent, appointed its superintendent, since which time all records have been carefully kept and mining reduced to one responsible system. From the very nature of the deposit, already described, the mining problem is not a difficult one as yet, as the work is done above water level, as in a huge quarry.

The plan in general looks to an extension of a water level working face east and west from Furnace Creek, working in successive terraces in advance of one another, while keeping the main idea in view. The general features of the system have already been referred to.

The railroad tracks within the mine, of course, advance with the mining, the shifting being generally done in the summer or fall of the year. Between the track and the slopes a platform of untouched ground is left from 10 to 25 feet wide and about 6 feet high, for the double purpose of saving the tracks and cars from the injury of falling ore after blasting and for facility in loading the ore into cars. The fine surface ore and the broken "run of mines" is of such a character that it can be as readily loaded as mixed rock and earth, and the workmen are alternately diggers and loaders. The large lumps which result from the first blasts are wedged if soft enough, or again broken by a blast.

The commercially prepared ore, of course, requires sorting into lumps and fine ore (there is comparatively little waste stuff), but the cost involved in the transfer from the blasted ore slope to the cars is not necessarily much greater than loading so much mixed rock and dirt from an ordinary railroad cut, except in the weight of the material moved.

Skilled mining labor, therefore, in the great open cuts, does not enter into the ques-

tion of expense at all, except in so far as the Cornwall miner is required to judge exteriorly as to the grade of the ore where assortment is required. And even here, if negligent or incapable, a watchful head miner can correct his error.

The miners work in gangs of about 35 or 40 men each, every gang having its head miner or boss. They are mostly diggers simply, as no hand-drilling is pursued in the mines. In all the mining operations the precision, celerity—and, I judge, the economy—of the work is enhanced by the use of the compressed-air drills. The Cornwall drills, six in number, are of the Ingersoll type, 3½-inch cylinder, hand feed, and 6½-inch stroke. They approximate 300 blows a minute, and in Cornwall ore seem capable of making from 150 to 160 feet per day of 10 hours, boring 3-inch holes. The holes are usually drilled 5 feet apart and 12 feet deep, the charge of dynamite varying from 5 to 8 pounds per 12-foot hole, according to the nature of the ground. The air compressor is of the duplex type, and 20-inch steam cylinders and 21-inch air cylinders, both having a 42-inch stroke. The boilers which are used as regulators furnish air at about 60 pounds pressure, and the furthest point reached in the mines is about 1800 feet from the compressor, where there is a loss of about 2 pounds pressure.

The drills are necessarily kept in advance of the mining, a series of holes being drilled and plugged ready for charging and firing as demand arrives. And herein consists the great usefulness of the air drills. Formerly large quantities of the different classes of ore had to be kept in stock at the mines ready for the varying demand of customers. These ore piles necessarily interfered with mining operations, and during cold weather, exposed to snow and rain, the freezing of the mass added considerably to the total cost of shipment.

A force of about 200 men was employed in the fall of 1885, and the output was from 35,000 to 45,000 tons per month\*, or an average of 7 to 9 tons per man per day, allowing 25 days to the month, and with wages of 13 to 15 cents per hour. The total cost of mining ore, therefore, at Cornwall can hardly exceed 25 to 30 cents per ton—a figure which speaks volumes for this industry.

In conclusion of this subject the following table is designed to show the approximate ore tonnage run from this vast deposit between 1740 and 1885:

Table Showing the Approximate Production of Iron Ore at the Cornwall Mines from 1740 to 1885.

Year.	Tons.	Cwt.
1740 to 1790, three furnaces, each 2000 tons annually	300,000	
1790 to 1848, six furnaces, each 2000 tons annually	700,000	
April 1, 1848, to January 1, 1853	113,150	11
January 1, 1853, to February 1, 1864 (date of formation of C. O. B. Co.)	1,351,717	05
1864, 11 months	105,915	2
1865	114,802	11
1866	216,659	16
1867	325,755	3
1868	165,843	3
1869	173,428	16
1870	174,467	17
1871	176,084	15
1872	193,317	1
1873	166,722	6
1874	112,429	4
1875	95,924	17
1876	137,901	11
1877	171,588	19
1878	179,299	3
1879	268,488	6
1880	231,172	18
1881	249,080	1
1882	309,620	11
1883	363,143	10
1884	412,319	17
1885	508,864	6—4,902,539 13

Total from mines to Jan. 1, 1886, 7,327,547 09

The records from April 1, 1848, through the courtesy of Mr. Boyd, are taken from the company's books, and are therefore reliably representative of the last 37 years' mining. From 1740 to 1790, a period of 50 years, an average has been struck of 6000 tons, based upon the consumption of three charcoal furnaces using this ore. From 1790 to 1848, a period of 58 years, the consumption was about 700,000 tons, based upon the product of six furnaces, all using Cornwall ore.

Though the grand total thus compiled—7,000,000 tons—seems a large one, it hardly begins to convey what the possibilities of this wonderful deposit really are. The production of 1885, a total of 508,864 tons, is the demand during what may be termed an "off year" in iron; it is the output from only about one-third the power of the present plant, and it is fairly within bounds to say that a yearly output of 2,000,000 tons could be readily managed without the slightest interference to the workings or any serious change in the mining plans, and this output could be kept up for many years before exhausting the amount of ore above water level in the three hills.

The last paper of the session was by Mr. R. P. Rothwell, of New York City, on a "New Method of Submarine Tunneling."

#### Friday's Excursions.

Friday forenoon and afternoon were set apart for excursions, the chief point of interest being the Clapp-Griffiths plant of Messrs. Oliver Bros. & Phillips. The special train bearing the excursionists left the Pittsburgh and Lake Erie depot at 10 o'clock. The number was much larger than on Wednesday, some 300 filling the coaches provided by the Pennsylvania Railroad.

The first stop was at the Tenth Street Depot to visit the glass works of Duncan & Son. Some of the excursionists who were more interested in metallurgy and mills than in the manufacture of glass took occasion to visit the rod mill of Oliver Bros. & Phillips. At the Duncan Glass Works the various processes of manufacturing colored glassware were explained and witnessed. The visitors, especially the ladies, were astonished, as they also were at the O'Hara Works, at the beauty of design and the richness of the coloring of the glass made. Mr. Hersey, one of the partners, who acted as escort for the party, gave the ladies some specimens of the ware as mementoes of the visit.

The next place visited were the Clapp-Griffiths Works of Oliver Bros. & Phillips. As this plant and its operations have been

\* Average for the year 1885 being 42,405 tons per month.



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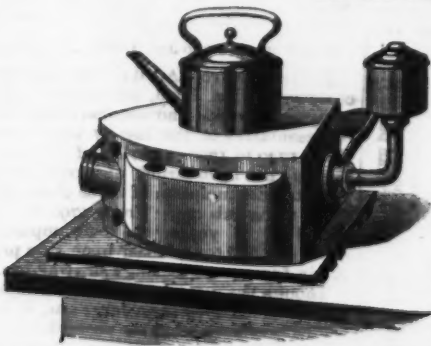
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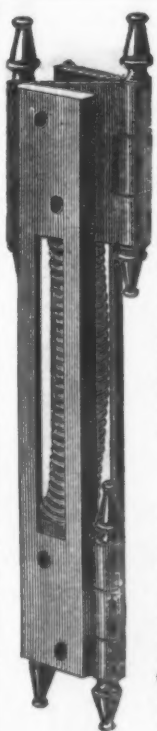
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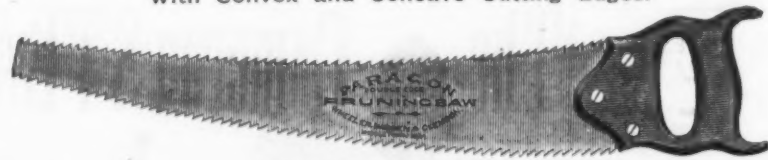
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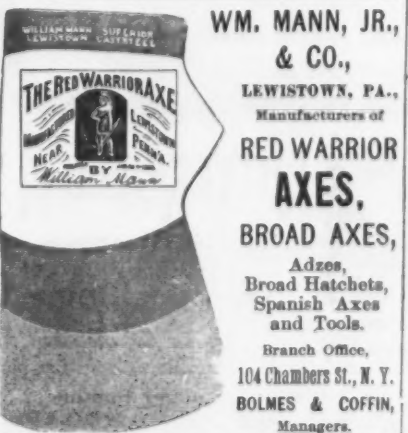
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The Stone is best quality Berea Grit. We claim the nicest Mounted Grind Stone ever put upon the market. The legs are wrought iron, the frame malleable iron, painted black. The wood beams and treadle are painted bright vermilion. The malleable shaft will interchange with any stone easily and quickly put in. We ship knocked down in three parts, via Stone, Woods, Irons.

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We also Manufacture Brass and Bronze Show Stands for Fancy Goods. Catalogues Mailed Free.

so thoroughly described and commented upon in our columns, we need only say here that the visitors were delighted and many of them interested and also convinced as to the merits of the "process." The discussion begun the day before over the question as to whether it was a "process" or not was resumed, but, of course, not settled.

Jones & Laughlins' mill was next visited, chiefly to see the application of natural gas to the various processes of iron-making. By this time a pelting rain was falling, and the ladies of the party wisely remained in the cars.

The last point visited were the blast furnaces and steel plant of the Edgar Thomson Works. During the trip the Duquesne Club again surprised the visitors with their possibilities in the way of lunches. At the Edgar Thomson Works the visitors were so interested that the local committee gave up all attempts to adhere to the schedule time, and allowed them to roam at will, so that the train was nearly two hours late on its return.

This ended a most interesting series of excursions. At every works visited natural gas was the only fuel used, and the visiting members were thus enabled to witness its application and study its values and economies under almost every condition. The opportunity to examine critically and thoroughly the Clapp-Griffiths plant was accepted by many who had more than a mere curiosity, and it is fair to say that many left with a different view of its capabilities and value than that they brought with them.

### Friday Evening's Session.

The closing session of the Institute was held Friday evening. Mr. John Birkenbine, in his usual happy vein, offered the usual tribute of thanks to all who had contributed to the success and pleasure of the society, and wittily moved that permission be granted to Pittsburgh to invite the Institute to the city again.

The financial report of the Council, read by the secretary, was a gratifying exhibit:

Receipts for the year.....	\$16,864.62
Expenditures.....	12,884.54
Surplus.....	\$3,980.08
In addition the treasurer holds:	
U. S. 4 1/2 per cent. bonds.....	\$4,400.00
U. S. 4 per cent. bonds.....	900.00
Total.....	\$5,300.00
Market value.....	\$6,500.00

The dues for the year were \$12,672. Since the balance from the statement of last year was \$1667.89, the actual receipts of the year were \$2312.19 greater than the expenditures.

The Council has now in course of preparation a handsome geographical map of the United States and part of Canada, which will be issued to members as soon as completed.

The result of the election showed as follows: President, Robert H. Richards, Boston, Mass.; vice-presidents, W. B. Cogswell, Syracuse, N. Y., James F. Lewis, New York, and Joseph D. Weeks, Pittsburgh, Pa.; managers, H. M. Howe, Boston, J. E. Johnson, Longdale, Va., and W. G. Neilson, Philadelphia; treasurer, T. D. Rand, Philadelphia; secretary, R. W. Raymond, New York. The venerable and venerated Dr. Percy, of England, was made an honorary member, and 128 names were favorably acted upon for membership. In this list are included eminent men in every part of the United States, and even from far-off Austria and Japan.

Ten associates were advanced from the grade of associate to member. The membership at the close of the year was 1422.

One of the most interesting subjects brought before the Institute during the session was the making of wrought-iron castings by the Mitis process, by Mr. Ostberg, whose paper we shall print in a future issue.

The last paper of the session was a "Note on the Hibernia Mines," by J. Wesley Pullman, of Philadelphia.

The following papers were read by title and will appear in the published "Transactions": "The Sampling of Cast-Iron Borings," by Porter W. Shimer, Easton, Pa.; "The Operation of the Warwick Furnace," Pottstown, Pa., by John Birkenbine; "A Chilled Furnace Hearth," by James Gayley, Braddock, Pa.; "The Iron Ores and Coals of Alabama, Georgia and Tennessee," by John D. Porter, Cincinnati, Ohio; "The Classification and Constitution of Pennsylvania Anthracites," by C. A. Ashburner, Philadelphia; "The Mineral Resources of the Hudson Bay Territory," by Robert Bell, of Ottawa, Canada; "The Geological Map of the United States," by Prof. C. E. Hitchcock, Hanover, N. H.; "The Nova Scotia Gold Mines," by E. Gilpin, Jr., Halifax, N. S.; "Note on a Deposit of Fire-Sand in Clinton County, N. Y.," by A. F. Brainerd, Birmingham, Ala.; "Contributions to a Knowledge of the Structure and Formation of Mineral Veins," by W. P. Blake, New Haven, Conn.; "The Use of Hydraulic Wedges as Substitutes for Explosives in Coal Mining," by R. P. Rothwell, New York; "The Use of Gasoline Gas in a Chemical Laboratory," by Prof. C. E. Wait, Rolla, Mo.; "A Cupel Machine," by the same author; "An Automatic Detector of Marsh Gas," by N. W. Perry, Norwood, Ohio. The process used at the Comstock for "Refining Copper Bullion from the Amalgamation of Tailings," by A. D. Hodges, Jr., Boston, Mass.

Mr. James C. Bayles, the retiring president, after a few graceful words of thanks, declared the sessions adjourned.

In no branch of rural economy is there so much needless waste of forest products as in fencing. A great reform must needs be instituted, as the expense of lumber grows greater year by year. A single square acre requires 50.6 rods of fence to inclose. It has been stated that from one-quarter to one-eighth of the present fences of the country would be amply sufficient to keep stock within proper limit. The amount thus saved in a year would aggregate millions of dollars in some of the larger States. Estimates have been made showing the cost of fences in the United States to be \$1,700,000,000, and the annual cost for maintenance at \$198,000,000, including interest at 6 per cent. upon the original cost. The farm

fences in the State of Maine are estimated at 41,952,000 rods, or 131,000 miles in length. The first cost cannot be reckoned at less than \$42,000,000. Upward of \$8,000,000 are invested in farm fences in the State of Connecticut. Total cost of fencing in New York State aggregates \$228,874,611; Pennsylvania, \$179,834,494; Ohio, \$155,580,673; Indiana, \$100,759,415; Illinois, \$128,856,513. These figures give some conception of the immense totals of lumber consumed for the single purpose of fencing.

### Foreign Markets.

#### FRANCE.

PARIS, February 24, 1886.—Metals.—Our market has been moderately active and steady. Lead showing an improvement. We quote in francs per 100 kg.: Copper—Chili Bars, 102 @ 106; Ingots and Slabs, 102.50; Best Selected, 111.50, and Pure Corocoro Ore, 106. 7 1/2. Banca, 232.50; Billiton, 251.35; Straits, 245.50; Australian, 245, and English, 247.50. Lead, 32.50 @ 33.25, and Spelter, 40.50 @ 41.50. Iron.—The general market in France exhibits greater strength, but our own remains neglected at 12.50 francs per 100 kg. for Merchant. From the Northern Department a quiet state of affairs is reported, with some shading to secure more important commands. In the Ardennes more orders have been received by foundries. Nail manufacturers, on the other hand, barely receive orders enough to keep their works going. In the Haute-Marne region there is little actual change, but makers are less disposed to make the least concessions for the securing of orders at ruling rates. They quote Coke Merchant 14 francs, and Mixed 15. Axes in the rough are bringing 15 francs; Finished do., 23; Gray Pig Iron is selling at 6.30 No. 2, and 6.50 No. 3. Coal has been in active request in consequence of the severity of the weather, and Domestic has brought slightly higher prices in this city.—*Moniteur des Interêts Matériels*

#### BELGIUM.

BRUSSELS, February 24, 1886.—Iron.—The Iron situation in Belgium has undergone no perceptible change during the week; the general character is still a feeling of weakness, but prices are nominally upheld. On all hands there is a complaint of lack of work, so that fresh orders are looked for with impatience. The few dropping in are limited very low. Hope is now centering on the building trade in spring. We quote Luxembourg Foundry Fig 4.10 francs per 100 kg.; do. Puddling, 3.90. The quotation at Charleroi is 4 @ 4.70. As for Merchant Iron, not more 9.75 can be got for export and 10 francs for home use. No. 2 is held at 10.75, and No. 3 at 11.50. For Beams manufacturers try to obtain 2.75 @ 10.75, but not more than 2.50 is offered. Sheets and Angles remain steady. Although the situation of the Iron trade in Belgium as it appears at present is far from encouraging, ironmasters feel confident that the spring trade will bring them valuable export orders from Transatlantic countries in view of the great cheapness of their products. Netherlands India, among other countries, will again be in the market, and it is fair to presume that orders from near-by countries will not be wanting besides. Coal has been fairly active, the demand being stimulated by the cold weather we have had since the beginning of the year.—*Moniteur Industriel*

#### GERMANY.

HAMBURG, February 24, 1886.—Iron.—Our Dortmund correspondent reports as follows: Although the general Iron market has changed but little, rolling-mill products begin to look up gradually. Iron Ore is dull and weak; Pig Iron is quiet, most of the purchasing for the first quarter having been done. There has been a good demand for Merchant Iron. Boiler Sheets are strong. The Wire branch shows no improvement, orders being by country. While Steel Rails have been well sustained, this cannot be said of sleepers, which have suffered quite a decline. While Locomotive and Car builders are profitably engaged, machine shops, foundries and boiler-makers and manufacturers of Structural Iron all complain of a lack of work. We quote Spiegel in Rhensia Westphalia 47 @ 49 marks, and Merchant Iron, 110; Steel Rails (Bessemer), 135 @ 140. In Upper Silesia the Pig-Iron market does not inspire much confidence at ruling rates. Common Puddling is bringing 48.50. Steel works are not occupied to the full extent of their capacity. Rolling mills are tolerably well engaged; stocks of Thin Sheets are reduced to a minimum. There is more doing in Steel Rails. Common Merchant is selling at 95 @ 110 marks. Metals, with quite a limited business, are unchanged.—*Borsenhalle*

#### HOLLAND.

ROTTERDAM, February 30, 1886.—Tin.—Little transpired for several days past; consumers only buy enough to cover immediate requirements, and speculators are inactive. We quote Banca 55.75 @ 56, and Billiton 55 @ 75 guilders per 50 kg.—*Koch & Fibbeom*

#### SPAIN.

MADRID, February 23, 1886.—Metals.—As per official returns there were shipped from Spain the following quantities during the last three calendar years:

	1883.	1884.	1885.
	Tons.	Tons.	Tons.
Blende.....	14,482	27,430	1,970
Calamine.....	28,489	27,437	32,483
Pyrites.....	521,080	558,146	725,424
Iron Ore.....	3,952,546	3,656,232	3,546,828
Ingot Copper.....	21,192	16,672	24,962
Quicksilver.....	515	1,199	1,011
Pig Lead.....	116,109	108,227	109,014
Total.....	4,654,843	4,375,173	4,412,749

#### AUSTRIA.

VIENNA, February 21, 1886.—Iron.—There is a better feeling in the Iron trade in this city, in anticipation of an active demand for building purposes. Building will be early and extensive. Prices are firm and unaltered. Metals are in better request. We quote Copper 57 @ 60 florins per 100 kg.; Tin, 122 @ 124.50; Spelter, 15.25 @ 19; Lead, 14.50 @ 16; Antimony, 41 @ 42, and Quicksilver, 218.—*Austrian Trade Journal*

#### CHILI.

VALPARAISO, January 8, 1886.—Copper.—The market opened a fortnight ago with a good demand at the low price of \$15.50 @ \$15.80, but subsequently more favorable cable news soon carried the price to \$16.40, sales aggregating 28,500 quintals. The latter price, with 30/ freight, is equal to 239. 10/1 in England. Nitrate of Soda has been unusually dull, in sympathy with unfavorable European advices; as the stock is light, however, holders have not pressed sales. Sales amounted to 110,000 quintals at \$3.17 1/2 for 95 s. which, with 23/2 freight and 26 1/2 d. exchange, equals 9 3/4 s. cwt. in England. Some small purchases have been made for American account. December shipments to Europe sum up 38,000 tons; loading for Europe, 6900 tons. Charters amount to 5500 tons for Europe and 1850 tons for the United States. Coal is weak and drooping, owing to the large stock on the spot, and quotations are nominal. We quote Rock Hartley, 20; Orrell, 18/6, and Australian, 17/6. Exchange, 90 days, 25d. @ 26 1/4 d.—*Weber & Co.*

#### EAST INDIES.

PERANG, January 12, 1886.—Tin.—The only demand there has been during the fortnight has been for Europe at \$31.95 @ \$31.65, at which the market closes weak. For Europe 10,000 piculs were taken, and for China 650. Receipts, 3200 piculs. Last year's exports from here have been 146,170 piculs to England, against 132,825 in 1884; 1344 to the Continent, against 992, and 21,894 to the United States, against 20,502. Since the 1st inst., 4694 to England and 430 to the United States. Exchange, four months, bank, 3/4 1/4.—*Schmidt, Kustermann & Co.*

COLOMBO, January 15, 1886.—Plumbago.—The market has remained steady at ensuing quotations: Large Lumps, 213. 10/; Ordinary, 212. 10/; Chips, 209. 12/6, and Dust, 205. 12/6, cost and freight per steam; by rail, 5/ loss.—*Volkart Brothers*

The firemen employed by the New York Steam Co. struck last week, whereupon the clerks in the office entered upon the service of shoveling coal.



# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, March 11, 1886.

DAVID WILLIAMS, Publisher and Proprietor.  
JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.  
CHAS. KIRCHHOFF, Jr., Associate Editor.

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## REMOVAL.

The office of this journal is removed to 66 and 68 Duane Street.

## THE IRON AGE INDEX.

The Iron Age Index, Vol. XXXVI, July to December, 1885, is now ready, and will be sent to subscribers on application.

## Condition of the Blast Furnaces of the United States, March 1, 1886.

We give in another column our usual monthly statement of the condition of the blast furnaces of the country, showing the number and capacity of furnaces in and out of blast March 1, 1886.

In a condensed form the table makes the following showing as to the condition of the furnaces March 1, 1886:

Fuel.	In blast.		Out of blast.	
	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal.....	46	6,515	176	17,461
Anthracite.....	104	80,115	117	35,314
Bituminous.....	109	84,490	115	42,620
Total.....	359	91,000	408	85,395

The same remark can be made as to the difficulty of making up this table, owing to the banking of coke furnaces that was made last month. The slight decrease in the number of bituminous furnaces may be banked furnaces reported as out of blast, though when a furnace is reported as banked it is regarded as in blast. The make of pig iron at the bituminous furnaces the past month is made less than is indicated by the figures of capacity.

This statement, as compared with that of February 1, shows a decrease of six in the number of charcoal furnaces in blast; a decrease of three in the number of anthracite, and of four in the number of bituminous. The change in the capacities of the furnaces in blast, however, is not so marked, as will be seen from the following comparative table:

Fuel.	February 1.		March 1.	
	No.	Capacity.	No.	Capacity.
Charcoal.....	52	7,408	46	6,515
Anthracite.....	107	80,100	104	80,115
Bituminous.....	118	83,354	109	84,490
Total.....	277	92,757	259	91,000

As compared with a year ago the increase in coke and anthracite furnaces in blast is quite marked. At that time but 86 anthra-

cite furnaces, with a weekly capacity of 22,880 tons, were in blast, and 91 bituminous, with a weekly capacity of 46,774 tons.

The number of anthracite and bituminous furnaces in blast at the beginning of each month of last year and the first three months of the present year, together with their weekly capacity, is as follows:

1885.	Anthracite.		Bituminous.	
	No. in blast.	Capacity per week.	No. in blast.	Capacity per week.
January 1.....	88	21,564	82	36,812
February 1.....	81	21,189	87	46,858
March 1.....	86	22,880	91	46,774
April 1.....	82	21,704	90	45,635
May 1.....	90	30,789	95	45,397
June 1.....	79	19,884	94	44,498
July 1.....	81	20,444	92	43,945
August 1.....	77	20,580	86	44,245
September 1.....	78	20,199	88	42,609
October 1.....	75	20,318	88	43,234
November 1.....	86	24,270	89	44,101
December 1.....	94	26,816	99	49,790
1886.				
January 1.....	104	80,111	114	54,199
February 1.....	107	80,100	113	55,354
March 1.....	104	80,115	109	84,490

## The Nail Strike and Last Year's Supply of Nails.

The statistics of the production of cut nails during the year 1885, just issued by the American Iron and Steel Association, are particularly interesting this year, because they illustrate very forcibly what has been the effect of the great strike in the Western nail mills. The result has been that the production has fallen off nearly 900,000 kegs during the year 1885, as compared with 1884, the exact figures being respectively 6,696,815 and 7,581,379 kegs. The matter is put in the clearest light by the American Iron and Steel Association by grouping the product of nails east of the Alleghany Mountains, including Virginia, and comparing it with the production in the West and South at the same time, as follows:

Sections.	1883.	1884.	1885.
Kegs.	Kegs.	Kegs.	Kegs.
East.....	2,728,045	2,676,014	2,978,784
West and South.....	5,099,992	4,905,365	3,418,081
Total.....	7,768,737	7,581,379	6,696,815

In other words, the Western mills lost a business aggregating nearly 1,500,000 kegs. Of this, roughly, 600,000 kegs were captured by Eastern mills. This would leave 900,000 kegs unaccounted for which would have been drawn from stocks had the consumption of 1885 been equal to that of 1884. Every indication, however, points to the fact that it was not so large. The high prices of cut nails and the active competition of wire nails together probably had the effect of considerably restricting consumption, so that only a part of the large deficit alluded to was called for. There is no means of getting at the actual figures, because we have no data on the stocks—large in the aggregate—carried in the beginning of 1885 by jobbers, dealers and retailers. Eastern and Central Pennsylvania were the heaviest gainers, and the Wheeling district, Illinois and Wisconsin were the heaviest losers. Mr. George W. Cope, secretary of the American Iron and Steel Association, has grouped the Wheeling and the Central Pennsylvania districts together, and reaches the following table showing their relative importance:

Districts.	1883.	1884.	1885.
Kegs.	Kegs.	Kegs.	Kegs.
Wheeling district.....	2,302,410	1,991,570	1,297,138
Central Pennsylvania.....	960,941	1,088,996	1,472,797

The figures for the year 1885 are, of course, no guide to the capacity of the two districts to compete with one another. It appears, too, that the Wheeling district has before been subject to pretty wide fluctuations in output. Thus for a series of years it participated in the make of the whole country as follows:

Year.	Total.	Wheeling district.	Per cent.
1880.....	5,370,512	1,470,408	27.4
1881.....	5,794,206	1,702,189	29.2
1882.....	6,147,097	1,498,148	24.4
1883.....	7,768,737	2,302,410	29.6
1884.....	7,581,379	1,991,570	26.3
1885.....	6,696,815	1,297,138	19.3

How the steel plants erected in the Wheeling district will affect its rank remains to be seen. So far as the different States and Territories are concerned, their production in the two years was as follows:

States.	1883.	1884.	Increase or decrease.
Kegs.	Kegs.	Kegs.	Kegs.
Pennsylvania.....	2,457,916	2,361,678	-96,238
Ohio.....	920,589	1,310,715	+390,126
West Virginia.....	778,069	1,088,611	+310,542
Massachusetts.....	834,318	527,196	-307,122
Illinois.....	978,361	712,650	-265,711
Indiana.....	274,271	443,284	+169,013
Virginia.....	226,487	207,678	-18,809
California.....	208,597	129,263	-79,334
New Jersey.....	181,680	208,317	+26,637
Alabama.....	137,000	100,000	-37,000
Kentucky.....	135,628	41,329	-94,299
Tennessee.....	98,851	130,164	+31,313
Wisconsin.....	86,257	102,851	+16,594
Colorado.....	64,310	55,944	-8,366
Nebraska.....	60,000	40,000	-20,000
New York.....	41,611	14,300	-27,311
Total.....	6,696,815	7,581,379	+884,564

New Jersey shows a falling off in spite of the stimulus of higher prices, chiefly because one of the leading mills in that State was shut down, owing to disagreement among its owners. The growth in the make of California is interesting, because it indicates that at no distant date the Pacific Coast market may be lost to our Eastern mills.

One valuable statement is made by the American Iron and Steel Association which fully bears out the predictions made as to the inroad of steel nails. In 1884 only 393,482 kegs, or 5 per cent. of the total production, were steel nails. In 1885 the quantity had risen to 1,324,027 kegs, or over 27 per cent. of the total, in spite of the fact

that many of the mills of the Wheeling district were idle, and that other works have only during 1885 completed their steel plants or begun to provide themselves with the facilities for making their own raw material. Considering all the circumstances tending to retard it, the substitution of steel for iron has made marvelous strides.

## Our New Navy.

Like the earlier report by the Senate Select Committee on Ordnance and War Ships, the House Committee on Naval Affairs is strongly in favor of prompt measures to place our equipment for naval defense on a par with at least third-class powers. The record of the past decades has been sufficiently humiliating. We have practically spent enough to keep abreast of other nations, without having really anything to show for it. We have now reached the point where our entire seaboard is at the mercy of so insignificant a foe as Brazil. The report to which we refer clearly states how utterly helpless we are when it enumerates six ports alone on the Atlantic Coast and one on the Gulf whose destructible property is valued in the aggregate at nearly \$4,000,000,000, upon which a few ironclads could lay tribute with impunity. One point is lightly touched, which should, we think, be more fully brought out. The committee states that it would take only 10 days from the opening of hostilities for two Brazilian ironclads to appear before New York, and probably the ships of war of any European nation of any consequence could reach us in two or three weeks. Now a notion widely prevails, which may account for much of the indifference on this subject, that in a happy-go-lucky fashion some bright inventive genius will turn up in the moment of greatest emergency and free us from danger. Some foundation is given to this hope from the fact that there have been such instances in our history. But conditions have changed since then, and time has become a far more important element in the question. While we might be developing the most revolutionary inventions in naval warfare with the energy born of necessity, our leading coast cities might be in ashes.

The bill introduced by the Committee on Naval Affairs to construct 10 war vessels is one of the most important measures before the House of Representatives. It provides for the building of two double-bottomed armored vessels of 6000 tons, designed for a speed of at least 16 knots, each vessel to cost, exclusive of armament, not more than \$2,500,000. Three protected double-bottomed cruisers are also provided for, between 3500 and 5000 tons, to have the highest practical speed, the three vessels to cost not exceeding \$4,000,000. One torpedo cruiser is to be constructed, of about 800 tons, with full torpedo outfit, to attain a speed of at least 22 knots, the cost of which is not to exceed \$300,000. The bill also provides for four first-class torpedo-boats, costing in the aggregate not more than \$400,000. These vessels are to be constructed of steel of domestic manufacture having a tensile strength of not less than 60,000 pounds per square inch. The armor to be used must be of best obtainable quality and of domestic manufacture, provided this can be obtained at a reasonable price and in reasonable time; otherwise the Secretary of the Navy is authorized to purchase it abroad. One or more of the vessels are to be constructed in United States navy-yards, and all of them are to be so constructed if contracts at reasonable prices cannot be made with responsible parties. The engines, boilers and machinery are to be of domestic manufacture, and procured by contract unless these cannot be obtained at fair prices, in which case the engines, &c., are to be constructed at the United States yards. Authority is given to purchase abroad such shafting and machinery as cannot be procured in the United States. This would furnish, with some of the few vessels we possess, a fair nucleus for a navy worthy of the country. Then it would become necessary to build a number of modern forts for the defense of our leading ports. With due diligence and judgment in investigating and developing independently made inventions, and thus keeping in the van of progress, we would have that security that a sense of power gives.

It now seems more than likely that the railroad-brake question, which for a number of years past provoked such heated discussion in England, but of which little has been heard recently, will again be taken up. Renewed attention has been directed to the subject by the recently issued report of the Government Inspector on a collision which occurred late last year at a station on the Great Southern and Western Railway of Ireland, a mail train fitted with the plain vacuum brake having run into an empty car which was standing against the buffer stops. The collision, it seems, was brought about by the failure of the brake to act, because the brake coupling between the engine and train became disconnected, causing the engineer to lose control of the train. However, there is nothing peculiar in this, and parallel cases are numerous. Rapidly running over the list of recent railroad accidents in England, in many of which, as in this one, an inefficient brake system was responsible for the trouble, the conclusion is irresistible that criminal neglect is a characteristic feature in the management of some

English railroads, requiring prompt and effective treatment. Shortly after the disastrous Penistone accident, which is still fresh in the memory of every one, there seemed to be some prospect of a speedy and satisfactory solution of the brake problem, especially as conclusive evidence concerning the relative merits of the brakes then and now on the market was not wanting. Public interest in the matter, however, seems to have lasted only a short time, and nothing was done to put a stop to the state of things then prevailing. The railroads which at that time used poor brakes have continued using them without restriction, and will use them in the future unless proper legal provisions are made to convince the offenders of the error of their ways. English papers have been and are now again active in their criticisms in the matter of brake practice, and deserve success in bringing about a change.

## Patent Royalties.

A question of great interest to manufacturers has recently arisen concerning the rights of a licensee under a patent. A manufacturer who desires to make use of some new invention or improvement obtains a license from the patentee permitting such use in consideration of the payment of a stipulated sum as license fee or royalty. The question which causes uncertainty is this: In case the patent is void and is so declared by a decision of the courts, can the licensee thereupon refuse to pay any further royalty under his license, or is he bound by the contract, which was made under a misconception of the rights of the patentee, and therefore obliged to continue to pay the fees? On first consideration it would seem that the licensee should be free to repudiate his license and to refuse the further payment of any royalty. This view could be supported on the ground that the patentee, in fact, had nothing to sell, his patent being in reality valueless, though giving him an apparent title. The contract would therefore be without consideration and binding force. And this view is correct as a matter of law where there is a naked license conferring the rights to use the invention without any recitals or admissions in the license itself to take away this right. The law is clearly stated by Curtis, in his treatise on patents, that the licensee is not bound by such an instrument. He may refuse to pay and may deny the validity of the patent in case he is sued for breach of contract or infringement. It has been held by the courts in an English case, which has been followed here, that the invalidity of the patent may be set up as a failure of consideration. But the trouble is that the licensee is usually so drawn as to contain recitals or admissions on the part of the licensee acknowledging the validity of the patent, and in this case the rule of law is different. The licensee is regarded to a certain extent as taking his chances as to the validity of the patent, and he is bound by these admissions. Before saying whether a licensee in any particular case must continue his payments it is necessary to examine the license and ascertain whether there are such covenants as to deprive him of his ordinary rights. If he has made these admissions he will be judged guilty of infringement if he goes on with the use of the invention. Even in cases where the licensee is permitted to defend on this ground (invalidity) and to repudiate his contract he is not allowed to recover the moneys already paid as royalties to the patentee, on the ground that he has had the benefit of what he bargained for. This has been expressly decided in a case arising in the United States.

Perhaps the strongest case in support of the rule that the admissions bind the licensee, and undoubtedly the most instructive one, is *Evory against Candee*, decided in 1879 by Judge Shipman, of the Circuit Court. This was the case of a license to use a process in the manufacture of boots and shoes, the amount of the royalty being fixed at 3 cents per pair for all shoes made by the licensee. The instrument contained the provision as to the validity of the patent, which reads as follows: "Whereas, letters patent of the United States dated November 6, 1866, numbered 59,375, were lawfully granted unto Evory, &c., for a new and useful invention consisting of a double expansible gore-flop used in the manufacture of boots and shoes; and whereas L. Candee & Co., of New Haven, manufacturers of rubber boots and shoes, are desirous of acquiring the privilege and license of using said invention in the manufacture and sale of shoes." This language was construed as and held to be an admission. There was also a provision authorizing the patentee to revoke the license upon non-payment of the royalty, and stating that such revocation should not impair the effect of the admission of the letters patent or reissue, or of the novelty, utility and practicability of the invention. Before the license was taken out or signed the New Haven manufacturer had grave doubts of the validity of the patent. He refused to sign the printed form which was first presented to him, because of the presence of a strong clause whereby this point was admitted. He stated his objections to the patentee, but expressed his willingness to take out a naked license without such a provision. He reserved to himself the right to deny the validity of the patent at any time he should see fit, and to contest it; also to refuse to pay the

license fees, and to continue to use the invention without such payment if he should thereafter conclude that the patent was void. He claimed that this verbal agreement was made with the patentee, and on the strength of it he was liable for the royalties, although prepared to prove that the patent was void for want of novelty. The patentee revoked the license for non-payment and sued for infringement. The licensee was bound by the terms of the license, although he had never paid any royalty under it, and stopped from setting up any defense. He was not allowed to claim his verbal agreement, on the ground that it varied and contradicted the written agreement. Of course, in case of fraud, where it could be proved that the license had been entered into under circumstances which showed intentional deception, the license would be allowed to show this and the license would be set aside. The licensee could then defend like any other person.

A case decided in 1883 in the New York Superior Court introduces a new element. It was there decided that the licensee could not urge the invalidity of the patent in defense of his refusal to pay the royalty, unless the patent had been declared invalid by a court of last resort—that is, by the Supreme Court of the United States. Patents are declared invalid in the first instance in the circuit courts of the United States. These courts have concurrent jurisdiction and equal powers. Thus it may and it does frequently happen that the same patent is declared valid in one circuit, while it is held invalid in another circuit. No circuit has any binding force on another. Instances are numerous and of every-day occurrence where a patentee is obliged to bring repeated suits to protect his patent, although it may immediately before have been declared good. It is possible for a patent to be sustained in many cases in the circuit courts, and yet finally be declared invalid in a later case in the same court. It is impossible, therefore, to know positively whether a patent is good or bad before it is passed by the court of last resort, the Supreme Court, whose decisions are binding on all the circuits. But would a decision of the Supreme Court declaring the invalidity of a patent relieve the licensee from his liability to pay the royalty under the license in spite of the admissions? This is an important question, the answer to which would settle the whole controversy, but it has not arisen or been decided as yet in the Federal courts. There is only a *dictum*, an expression of opinion, to that effect in a State court, but it is a just rule, and we can believe that it would be applied should the case arise. It is clear, however, that a decision of an inferior tribunal, the circuit court, will not have such an effect.

## Marine-Engine Friction.

It has been remarked frequently, and with a good deal of truth, that the literature of the triple-expansion engine is extremely limited, and that comparatively little attention has been given to the several important points involved in considerations of its performance. Much interest is therefore attached to any additions to existing information concerning it, and engineers will be pleased to learn that one English firm at least has taken up the subject of investigation in a very practical manner. Ignoring for the time the direct question of steam economy, the Central Marine Engineering Co., of West Hartlepool, England, have secured experimental data bearing on the subject of marine-engine friction. These are given in a recent issue of *Engineering*, and constitute, without doubt, one of the most interesting and valuable contributions that has yet been made to the subject. The experiments, we find, were made with the engines of the steamship *Cleveland*, which are a sister set to those of the *Enfield*, described in our issue of January 21 of this year, and have cylinders respectively 21, 35 and 57 inches in diameter, all with 3 feet 3 inches stroke. It should be remarked here that the company have a special arrangement of erecting table for the putting together of their marine engines, enabling them to be worked in steam before leaving the works, and it is gratifying to note that good use has been made of these facilities.

The engines, according to our contemporary, have been constructed to work with a boiler pressure of 150 pounds per square inch, but on the occasion of their trial in the erecting shop they were supplied with steam from boilers about 250 feet distant and at 80 pounds pressure. The speed of the engines was 63 revolutions per minute, while the vacuum was 25 inches. Two sets of indicator diagrams were taken under these conditions, one set with the expansion gear full in, and the other with the gear full out, the speed in each case being controlled by the throttle-valve. Reduced copies of these cards are given in *Engineering*, and show the following figures:

	Expansion gear full in.	Expansion gear full out.
I. H. P.	I. H. P.	I. H. P.
High-pressure cylinder.....	21.4	16.1
Middle cylinder.....	3.29	5.13
Low-pressure cylinder.....	21.9	23.1
Total.....	47.59	44.33

Respecting these results the builders say in our contemporary:

The indicated horse-power at 63 revolutions with loaded ship may be taken at 500, and calling the power developed in shop at 68 revolutions 45



indicated horse-power, the latter bears the proportion of 5 per cent. to the former. This, however, does not accurately represent the measure of the internal resistance under ordinary conditions, because the circulating pump was pumping out of the dock against a head of 19.5 feet, the suction-pipe being 450 feet long, with many bends, and the discharge-pipe the same length. The work of lifting water equal to the displacement of the pump through that head represents 5.5 horse-power, and, leaving friction through the small tubes as common to both cases, it would seem to be not extravagant to allow another 5.5 horse-power for friction in the long pipes to and from the dock. Taking 11 horse-power as work due to special circumstances, from the 45 horse-power, we have 34 horse-power, or less than 4 per cent., as the work expended in overcoming the internal resistance existing when the engines are on board ship and running light.

Although these results are not exactly what would have been obtained if everything likely to affect the figures had been taken into account, such as, for example, the power required to drive the screw shafting, which, we understand, was not included in this case, they are sufficiently accurate to be of the utmost value. At all events, they ought to be of some service in stimulating further experiment in the same direction. Thus far we have had nothing with which to compare the figures and must, therefore, await information from other quarters.

As was expected, practically no attention has been paid by the shippers to the so-called "pool" among the bituminous coal roads serving tidewater. The contracts closed by leading New England railroads and manufacturing concerns during the past few weeks place that beyond any shadow of a doubt. So far as we can learn, they were made for delivery at New England points on the basis of about \$2.15 at Baltimore, and \$2.25 at Philadelphia, Newport News and Norfolk. This puts the soft coal into Boston at about \$3.30 to \$3.35, which is surely not an exorbitant figure for the fuel considering the distance from the mines, where it probably cannot be put on cars for much less than 75 cents a ton, including allowances for general expenses, exhaustion of lands, &c. To the carriers it leaves a profit, which is small, it is true, when compared with the sums cleared on the carriage of fuel in former years, but is still fairly remunerative, especially where it is not necessary to haul over heavy grades. As matters stand now it looks as though the contest for the spring contracts will be as active and as favorable to buyers as it has been during the past few years, and that the era of higher prices has not yet come. The effort of the miners to force wages higher cannot help being a failure, under the circumstances. The men in the Cumberland had a severe lesson only a few years since, and every attempt in the same direction in the Clearfield region has signally failed.

Elsewhere we print the report of Examiners Clarke and Bates, adverse to the claims of Mr. Jacob Reese, of Pittsburgh, to a patent for the basic process of dephosphorizing steel in the Bessemer converter, and the dissenting opinion of Examiner Fisher. We are not surprised that Mr. Fisher dissents from portions of the report of Messrs. Clarke and Bates. Such phrases, "Scooping it in" and "Whip the devil round a stump," are, to say the least, unusual in grave official documents. As the matter now stands, on appeal, the weight of official judgment seems to be against Mr. Reese's claims. As it is still an open question, however, we refrain from discussing it to the prejudice of either party to the controversy.

One of the lines in which progress is going on quietly, but with encouraging persistency, is the improvement in the design and in the adjustment of roll trains. Formerly in all mills, and now in a good many of them, the head roller was an autocrat, because with his skill in adjusting the rolls he was master of the situation. Now the attention of mechanical engineers and metallurgists has been directed toward so designing the trains that as little skill as possible was needed to do his work. In some instances a point has been reached where a machinist of average intelligence may be relied upon in a few weeks' experience to occupy the place of one who once posed as a tyrant. As in many other departments of iron and steel manufacture, our rail works have led the van of progress. Only too many of our iron-makers are behind in this respect. They do not sufficiently appreciate the force of the maxim that "time is iron." Every moment saved in preliminary work means an addition to capacity, and we have heard it stated by one of the leading authorities in this branch of engineering that the trains could be counted by dozens where output could be nearly doubled by modifications and improvements in design. We are doing magnificent work in rail rolling and in some of our plate and wire-rod mills, and it should be a question of only a short time to bring the majority of our merchant mills to the higher standard thus reached.

In the absence of other stirring topics the daily press on both sides of the Atlantic has got into the habit of taking up industrial subjects and treating them in the sensational manner so dear to them in other directions. The American iron trade has repeatedly been a sufferer from such practices, and now Sheffield is having a taste of what it means to have a large and showy bubble blown from little substance. Somebody has dis-

covered that a number of Sheffield manufacturers make very poor cutlery. There can be no question that such is the case, and it is simply a matter of discussion how great and far-reaching the evil is, and to what extent Sheffield itself is responsible for it. German makers have for years made trash and branded it "Sheffield," shipping it to neutral markets. They have even had the audacity to send it to England, where some consignments were seized and destroyed. While these practices may be held to account for some poor work, they cannot be claimed to offer an excuse for all of it, by any means. We are far from accepting as correct the statements made by one of the Sheffield newspapers, whose accusations have a decidedly sensational ring; but it cannot be denied that in this, as in other directions, English manufacturers have allowed themselves to drift into a suicidal policy of sacrificing quality to price. Instances of this kind have been crowding one another rapidly of late. We may cite the very damaging testimony concerning the bayonets used in the English army, and the startling array of testimony brought out in the recent discussion on the quality of chains. It was not long since that very vigorous protests came from Canada concerning deceptions practiced in branding inferior bar iron as high quality. Such revelations will make buyers of English goods in this country doubly vigilant, and will offer to them an additional inducement to give articles of domestic manufacture the fair trial they deserve.

From Germany comes an account of several boiler trials which were recently made with the view of determining the advantages, in point of fuel economy, claimed for a new form of flue. The results were somewhat remarkable and want confirmation. The flue in question differed from the ordinary form in that it was furnished on the outside with longitudinal fins which thus projected into the water and practically offered an increased heating surface. It appears from available particulars that tests with two boilers, exactly similar in design, one of them, however, furnished with plain flues and the other with the flues described, showed a saving in fuel of 34 per cent. in favor of the latter, and pointed also to an increased steaming capacity. More complete utilization of the available heat is naturally to be looked for in the use of the new flue, but the figures given are much too high to pass unquestioned, and further investigation would no doubt modify them appreciably. It must also be borne in mind that the fins, with which each flue is supplied afford exceptional facilities for the lodgment of mud and feed-water impurities generally, and if the trouble, expense and decreased evaporative power entailed by the presence of heavy boiler deposits be duly taken into account, it seems probable that the balance of favor would rest with the plain flue. Should the saving, however, really turn out to be as large as that claimed, further examination would be advisable and might serve to bring into use in some places a boiler which, with all its drawbacks, would be a source of profit to its owners.

Wooden turbines have of late been proposed to meet the demand for an efficient and cheap water motor for small powers, and there is every reason to believe that within certain limits they will meet with a very favorable reception. Turbines, it must be remembered, have the advantage of being small in bulk for their power, and equally efficient for the highest and the lowest falls, and were it not for the fact that they are constructed wholly of metal their use would probably have long since become more general. Wooden wheels can in some cases be readily procured at a comparatively low price, and, as the question of first cost and ease of repairs enters very largely into the problem of successfully utilizing small water-powers for some purposes, and is of greater importance than a high efficiency, turbines have often been unable to compete with wheels of other types. This state of things, it is thought, can be changed by using wood as the structural material, thus securing the advantages of turbines without their drawbacks, and it has been found that in this way their cost can be reduced to about one-fourth of that of iron turbines. In some parts of Europe wheels of this class have been constructed partly of oak and partly of yew, and the results are understood to have been highly satisfactory in every respect.

We conclude this week our report of the annual meeting of the American Institute of Mining Engineers at Pittsburgh. The meeting was one of unusual interest. The attendance was large, the papers and discussions valuable, and the social features of the meeting delightful. The visiting members are under great obligations to the resident members for their careful and intelligent preparations. Every convenience was provided and the discussions were pleasant and instructive. Pittsburgh is a much more desirable place than it was a few years ago, and its traditional reputation for smoke and dirt cannot long outlast the introduction of natural gas.

**Deciding a Suit as to Barbed Wire.**—Judge Gresham has given an opinion in the suit of the Ohio Steel Barbed Wire Co. against the Washburn & Moen Mfg. Co. The suit was brought to recover royalties

## CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, MARCH 1, 1886.

(Compiled for The Iron Age.)

Location of Furnaces.	Charcoal.				Anthracite.				Bituminous or Coke.			
	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.
New England.....	14	9	660	5	405	1	0	0	160	1	0	0
New York.....	14	3	290	11	845	40	12	3,815	28	6,855	10	2,542
New Jersey.....	16	6	2,340	10	2,542	3	3	275	0	0	0	0
Pennsylvania.....	32	4	205	28	1,664	51	33	10,838	18	4,127	1	0
Lehigh Valley.....	44	16	4,020	28	5,955	24	12	3,092	12	1,880	37	21
Schuylkill Valley.....	37	21	5,585	16	3,075	16	13	11,880	3	2,400	1	1
Upper Susquehanna Valley.....	1	1	400	0	0	4	1	500	3	247	27	11
Lower Susquehanna Valley.....	6	4	1,526	1	140	26	11	3,544	16	3,955	1	0
Pittsburgh.....	1	0	0	1	140	12	7	2,651	5	1,760	7	2
Allegheny Valley.....	18	9	4,740	9	4,370	19	9	4,610	10	4,600	15	6
Shenango Valley.....	15	6	970	9	1,632	15	7	1,390	8	1,445	3	2
Youghiogheny Valley.....	3	2	750	1	400	10	6	2,633	4	2,010	2	2
Junata and Conemaugh Valleys.....	2	0	0	2	400	2	2	800	0	0	10	7
Maryland.....	15	2	160	13	935	5	1	150	4	720	1	0
Virginia.....	30	3	95	27	1,438	11	0	0	1	140	9	0
North Carolina.....	3	1	120	2	94	9	0	0	5	257	11	7
West Virginia.....	5	1	100	4	180	1	0	0	1	140	26	9
Ohio—Mahoning Valley.....	26	9	2,095	17	3,375	11	2	250	9	1,131	1	0
Central, Eastern and Northern	11	0	0	1	140	9	0	0	1	1885	2	1
Hocking Valley.....	2	1	210	1	100	1	1	1	1	1	1	1
Hanging Rock.....	5	0	0	5	495	1	0	0	1	140	1	0
Miscellaneous.....	8	0	0	8	875	9	1	240	8	890	5	0
Kentucky.....	9	1	240	8	890	5	0	0	5	257	11	7
Hanging Rock.....	5	0	0	5	495	1	0	0	1	140	26	9
Western Region and Miscellaneous.....	11	7	1,810	4	660	1	0	0	1	140	26	9
Tennessee.....	5	0	0	5	257	11	7	1,810	4	660	1	0
Georgia.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Alabama.....	11	7	1,810	4	660	1	0	0	1	140	26	9
Indiana.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Illinois.....	26	9	2,095	17	3,375	11	2	250	9	1,131	1	0
Michigan.....	11	0	0	1	140	9	0	0	1	1885	2	1
Wisconsin.....	9	0	0	9	1,885	2	1	210	1	100	1	0
Minnesota.....	2	1	210	1	100	1	1	1	1	1	1	1
Missouri.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Texas.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Utah.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Oregon.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Colorado.....	1	0	0	1	140	26	9	2,095	17	3,375	11	2
Total.....	224	46	6,515	176	17,461	221	104	30,115	117	25,314	224	109

paid the defendants and for the specific performance of a certain contract. The plaintiff alleged that it bought a license to manufacture barbed wire from the defendants, it being agreed at the time that in case the Washburn & Moen Co. granted a similar license to other parties with greater privileges than were accorded to the Ohio company the latter could on demand receive the same privileges. The plaintiff set up its claims on the ground that excessive privileges had been granted to Jacob Haisch, a barbed-wire manufacturer at DeKalb, Ill. Judge Gresham decided that the allegations set up were true, but that the Ohio company lost its right to demand equal privileges with Haisch and a repayment of royalties by reason of the breaking by it of a previous contract. The plaintiff set up a claim for \$150,000.

### WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., March 10, 1886.

The metallurgical interests were fully represented before the Committee on Ways and Means in behalf of those branches of American industry last week. On Thursday, March 4, the American Iron and Steel Association was represented by the following gentlemen, including B. F. Jones, president, Pittsburgh, and George W. Cope, secretary, Philadelphia:

Iron Ore.—A. C. Brown, Marinette, Wis. Pig Iron.—J. B. Moorhead, Philadelphia; J. G. Butler, Jr., Youngstown, Ohio; George B. Wiestling, Mont Alto, Pa.; William H. Barnum, Lime Rock, Conn.; C. E. Coffin, Muirkirk, Md.; H. A. Lurt, Marquette, Mich. Bar Iron.—Oliver Williams, Catawba, Pa. Plate Iron.—Washington Hastings, Wilmington, Del. Sheet Iron.—Charles L. Gilpin, Pittsburgh; Henry Whitley, Philadelphia. Cut Nails.—C. L. Fitzhugh, Pittsburgh. Wire Nails.—H. W. Hartman, Beaver Falls, Pa. Iron Rails.—W. E. C. Cox, Reading, Pa. Hoop Iron and Cotton Ties.—A. E. W. Painter, Pittsburgh; Thomas H. Wells, Youngstown, Ohio. Tin Plates.—John Jarrett, Pittsburgh. Wire Ropes and Wire.—Charles F. Washburn, Worcester, Mass.; F. W. Roebling, Trenton, N. J.; Cyrus Elder, Johnstown, Pa. Bessemer Steel.—Joseph Wharton, Philadelphia. Open-Hearth Steel.—W. B. Ridgely, Springfield, Ill. Crucible Steel.—William Metcalf, Pittsburgh; W. H. Singer, Pittsburgh; Benjamin Atha, Newark, N. J. Consumers of Iron and Steel.—John H. Ricketson, Pittsburgh; James M. Hibbs, Philadelphia; James E. Emerson, Beaver Falls, Pa.

### PROTEST OF THE AMERICAN IRON AND STEEL ASSOCIATION.

B. F. Jones, chairman, made the opening remarks, pointing out in general terms the objections to the bill, after which Mr. Cope read from a pamphlet prepared by Mr. James M. Swank. It constituted rather an argument against free trade than a practical view of the effect of the bill on American industry. Some Republican members of the committee spoke of it as somewhat disappointing, as it gave them few new facts upon which they could base a line of argument against the bill.

### MR. WHARTON ON THE STAND.

After the reading of the objections Joseph Wharton was called and was treated with inexcusable insolence by several members of the committee, who were looking more after the political capital they might make out of the relations of capital and labor than

to the real question before the committee. Mr. Wharton was followed by William B. Ridgely, James Emerson, James G. Butler, Jr., Thomas H. Wells and Henry Whitley.

### MEETING OF THE EASTERN PIG IRON ASSOCIATION.

On Friday night, March 5, the Committee on Legislation of the Eastern Pig Iron Association held a meeting at their hotel for conference. Those present were Hon. T. M. Reed, of Maine; Frank Hiseok, of New York, and Wm. McKinley, of Ohio, members of the Committee of Ways and Means. Wm. A. Ingham, J. W. Pullman, Frederick Prime, Jos. E. Thropp, committee, and de B. Randolph Keim, secretary, Eastern Pig Iron Association. Hon. B. F. Jones, president of the American Iron and Steel Association, Pittsburgh. Thomas H. Wells, of Youngstown, Ohio; J. C. Fuller, Philadelphia, president; Geo. B. Wiestling, Mont Alto, Pa., chairman; John Birkentine, secretary, and Geo. G. Lobdell, Wilmington, Del.; A. L. Tyler, Aniston, Ala., and H. A. Burt, Marquette, Mich., members of the United States Association of Charcoal Ironworkers. Hon. Geo. H. Ely, representing the iron-ore interests of the West; Gen. E. Burd Grubb and W. H. Patterson and Frank King, representing iron ore and pig iron in Virginia; J. G. Butler Jr., Youngstown, Ohio; E. H. Hitchcock, of St. Louis, Mo., representing Pilot Knob iron ore; E. B. Reese, of Baltimore, Md., and others. The presence of members of the Committee on Ways and Means enabled the committee of the Eastern Pig Iron Association and their guests to interchange views and to fully understand the situation and agree upon a line of action for the next day.

### MR. INGHAM PRESENTS THE CASE OF PIG IRON.

The hearing of the representatives of Eastern pig iron, charcoal iron and iron ore took place the next day, Saturday. Mr. Ingham, chairman of the committee of the Eastern Pig Iron Association, was called first. He opened his remarks by reading the protest of the association against the reduction of duty on pig iron. His argument was practical and exhaustive, and evidently presented to the free-trade members of the committee points difficult to controvert before the people of the United States. The treatment of the relations of British iron to the trade of the country was as follows:

"The depression in the iron trade is not confined to this country. Great Britain, with the ambition to supply the world, has built furnaces with a capacity far beyond her market. Being fenced out of the Continent by hostile tariffs, she has gone on accumulating stocks of unsold and unsaleable pig iron, till at the close of 1885 she had nearly 2,500,000 tons unsold—about one-third of her product for that year, 7,450,000 tons. This unsold British stock is a menace to the whole world. Continental nations have protected themselves against the British manufacturers, and their only hope for relief is a reduction in our tariff, to which they are now looking with anxious eyes. The British iron market rises and falls with their hopes of a reduction in our duties, with the prospects of the passage of the pending bill. The present prices of British pig iron range from 30¢ to 35¢, to 48¢, \$11.76, per ton, with exchange at 44¢, as to-day. The lowest priced iron is so inferior as to be hardly saleable here at any price. At 40¢, \$9.80, per ton a good English iron may be bought. If to this price at shipping port be added the present duty, \$6.72, the freight (now quoted at 5¢ to 10¢, but during the whole of last year ranging between 1¢ and

2¢), say \$1.75, with commissions, insurance and expenses, say 40 cents, it will be seen that a good quality of British pig iron can now be laid down in Atlantic or Gulf ports at about \$18.67 per ton. Now the present average cost at furnace of American pig iron east of the Alleghany Mountains is between \$14 to \$16 for mill iron and \$16 to \$18 for foundry irons per ton, to which must be added about \$1.25 to cover freights and charges to market. It is evident, therefore, that on some grades there is little or no margin for profit even with the existing duty, and that any reduction of duty would practically close our works."

After the conclusion of the protest, Mr. Hewitt and other members of the committee began a cross-examination of Mr. Ingham. Mr. Ingham took grounds against free raw materials and against a reduction of duties, and pointed out the important fact that labor alone would suffer by the passage of the bill. The committee, finding they were getting the worst of the argument, excused Mr. Ingham.

### MR. WIESTLING PRESENTS THE CASE OF CHARCOAL IRON.

Mr. George B. Wiestling, on behalf of the United States Association of Charcoal Ironworkers, presented their protest. It showed that the industry was in existence in 23 States and two Territories; that more labor is directly employed per ton of product in charcoal-iron industry than any other single branch; that reductions in duties by the tariff revision of 1883 had seriously crippled that industry; that from 1878 to 1883 the percentage of increase for the total pig-iron production was 101 per cent., and during the same period the production of charcoal pig iron increased 138 per cent., indicating a determination to keep abreast of the times and utilize all economic methods. In 1883 (the year of tariff revision) the total pig-iron production was increased 6.6 per cent., but the output of charcoal pig iron was less than in 1882 by 18 per cent. In 1884 the charcoal pig-iron production decreased 10.8 per cent., and in 1885 12.8 per cent. The decrease in the three years since the adoption of the present tariff is as follows: Total pig iron, 12.5 per cent.; charcoal pig, 42.7 per cent. Such a marked decline cannot be accounted for by general business depression. On January 1, 1883, the stock of charcoal pig iron represented 27.5 per cent. of the total pig iron in makers' hands, and this proportion has steadily increased until on January 1, 1886, it represented 55.8 per cent. of the total stock, or more than half of the product of charcoal pig iron in 1885. The steadily increased production of charcoal blooms was checked by the interpretation of the tariff of 1883, which admitted foreign wire rods, steel blooms, &c., at low duties, and since that time the decline has been so rapid that less than one-half the quantity of charcoal blooms was made in 1885 that was produced in 1882. They also urged a report of such duties as would encourage the manufacture from American iron of tin plates, of which over 200,000 are annually imported.

The committee fared no better at the hands of Mr. Wiestling than with Mr. Ingham. While explaining the uses of air in certain iron manufactures Mr. Morrison exclaimed:

"Then you would put a duty on free air?"

Mr. Wiestling: "I certainly should put a duty on air if it came from England."

Mr. Hewitt: "You do not favor free air?"

Mr. Wiestling: "No sir; not British air; I find there is too much British air now in this committee-room."



This pointed repartee led to great applause and laughter.

#### MR. ELY PRESENTS THE CASE OF IRON ORE.

Hon. George H. Ely, of Cleveland, representing Western iron ore, followed with a powerful argument against free ore. He showed that millions of capital were invested in opening the ore fields of Michigan, Wisconsin and Minnesota. His presentation of facts very clearly exhibited to the free-trade majority that those States would be seriously affected by the placing of ore on the free list.

#### A GENERAL CHARGE ON THE COMMITTEE.

The three interests having been heard, other gentlemen were called to elucidate more fully certain details. Joseph E. Thropp, of the Edge Hill Furnace, near Philadelphia, a consumer of foreign ore, attacked Mr. Hewitt on his own ground as to the benefit of free ore to tidewater furnaces. He not only showed that no advantage would be gained in price, but that the closing of American mines would make the home supply so precarious that our furnaces would be at the mercy of foreign monopolies.

Gen. E. Burd Grubb, representing ore and pig-iron industries at Lynchburg, Va., completely demoralized the free-trade members from the South by demonstrating that today the South was more in need of a protective tariff than the North. His argument was so clear-cut and convincing that Morrison and Hewitt seemed defeated, and the two Breckenridges, of Kentucky and Arkansas, and McMillin, of Tennessee, were eager for more information. General Grubb, too, made a decided hit.

Mr. F. S. Witherbee, of New York, next spoke of the New York iron-ore interests. He showed that great interest on Lake Champlain would be destroyed between two fires—the free ores of Canada and of the Old World.

J. Wesley Pullman was called up by Mr. Hewitt, who remarked that he knew as much about ore as any one in the United States. Mr. Hewitt took him up on New Jersey iron ore and iron manufactures. Mr. Hewitt's information being largely circumscribed by the interests of the Durham Furnace and Cooper, Hewitt & Co., and Mr. Pullman having commenced active life in their service, took the gentleman on his own line. Before Mr. Pullman got through, Mr. Hewitt's information on metallurgical matters, scarcity of Bessemer ore in the United States and protection of American labor was seriously impeached.

H. A. Burt, of Marquette, gave the committee a parting shot on Northwestern iron-ore interests.

In addition of the gentlemen who attended the meeting of the Eastern Pig Iron Association the night before, nearly all of whom were present at the hearing, there were also present Hon. A. B. Waldon, of New York, representing Hon. Smith M. Weed; A. G. Curtin, Jr., and Frank McCoy, of Bellefonte, Pa., and C. E. Coffin, of Maryland.

A hearing of labor, on Friday, March 12, will close the arguments before the committee.

#### The Basic Patent.

The following are the reports of the examiners of the Patent Office in the matter of the interference between Jacob Reese and Sidney G. Thomas, in which Reese contests Thomas's claim to priority of invention:

No. 5298. U. S. PATENT OFFICE, February 23, 1886.

#### BEFORE THE EXAMINERS-IN-CHIEF ON APPEAL.

In the matter of the interference between the application of Jacob Reese, filed February 15, 1882, and the Patent No. 218,336, to Sidney G. Thomas, granted August 5, 1879.

#### Improvement in the Manufacture of Furnace Linings.

The matter declared to be in interference is: "A mixture of lime or highly burnt slaked lime, and petroleum, tar or asphaltum, adapted for the manufacture of basic linings, substantially as and for the purposes herein set forth."

Thomas has a patent of date August 5, 1879, on application filed March 1, 1879. Reese applied February 15, 1882. So the public had had the invention on Thomas's patent some two years and six months before Reese applied. But it seems that Reese had a patent of date September 9, 1879, on application of May 31, 1879, in which the matter in controversy was described, but not claimed. May 1, 1880, he filed a reissue application, in which he made claims for such matter, which were rejected on Thomas's English patent. He then made a division, and June 26, 1880, filed a divisional reissue application, "C," in which he described and made claims to this same invention, and was rejected October 8, 1880, on the patent of Thomas now in interference, and notice given that interference would be declared if demanded.

This is the last action in the case; and without withdrawing or formally abandoning the reissue application Reese filed a new application while that was pending. It has since become abandoned for want of prosecution under the rule. But the case presents a serious question, which it is our duty to suggest to the commissioner if decision of priority should be in favor of Reese. Under which should he demand a patent? By the recent decisions of the Supreme Court, and the holdings of this office under them, Reese having described the invention in controversy in his original patent, and not claimed it, and having, in fact, disclaimed it in express terms, he must be deemed, under the circumstances and the lapse of time, to have conceded it as belonging to the public, and therefore he was precluded from issuing his patent and scooping it in. If he was precluded from claiming it under his reissue application, it is submitted that he cannot "whip the devil round a stump" by making the reclamation through a new application.

But to consider the issue presented to us on the other evidence. Thomas stands on his record date of filing, March 1, 1879. Reese goes into testimony. We will consider his own statements as substantially corroborated in regard to all the leading facts, and

as fairly and truthfully stating his case. He commenced experimenting with a view to thoroughly dephosphorize iron treated by the Bessemer process in the summer of 1865, and built a small plant for the purpose. What results were secured he does not state, nor, in fact, what was done. In 1866 he established a larger plant, and, having conceived of the idea of introducing a basic lining which was in use in puddling furnaces with the Bessemer practice, he "first tried Rodger's lining, which he had introduced into puddling furnaces." And having known lime to have been used in other furnaces he concluded to use it for a lining, and his first experiment was a failure, as the lime fused. He then tried it mixed with petroleum tar. This worked better. He then mixed lime with asphaltum "in a number of experiments." This was not fully successful, owing to causes which he states. But from the condition of the lining after use he conceived the idea of "burning the lime at a high temperature." He mixed lime so burned with petroleum and used it as a lining, and he says this and the lining made of the lime of the previous linings which had become hard by their use "were a success," and by the use of such lining he was "enabled to dephosphorize metal in both the Bessemer converter and open-hearth." This brought his experiments up to November, 1867, when his plant and other works were destroyed and caused him to "stop manufacturing these linings."

How extensively he had used them, or what amount of metal he had treated, and with what definite results, is not stated. He does not pretend that he made any discovery as to the effect of the lime lining upon the metal in the process of dephosphorizing. The only invention claimed is in the composition of the lining—a mixture of highly-burnt lime and petroleum tar, or asphaltum. The supposed invention rested right where he left it in November, 1867, until his application for patent. He says he thought it valuable and intended to utilize it in some way if ever he got the opportunity. But that he was broken up and reduced in circumstances, and not so situated as to put it to practical use, and too poor to apply for a patent. But in the meantime he took out a large number of patents—having induced others to take interests and advance money, and having borrowed some. But, giving him the benefit of extreme poverty, yet this long delay of some 15 or 16 years, while others had been in the same field, and Thomas had been before the public with his patent for two and a half years, before asserting any claim to invention in what he achieved by his experiments in 1866 and 1867, would seem to forever bar him from a patent.

It would be bad public policy and great injustice to inventors to allow anybody to thus experiment and secure valuable improvements in any art, and then lie by with his discoveries undisclosed, and yet be protected against all comers who should through great labor and expense make complete inventions of the same matter, and patent them and give them to the public. If a man's patent, after being before the public over two years, can be defeated by any invention thus kept in secret, what is the use of patents and what is the value of a patent? In considering all that Reese says he did, and his conduct since, and the disclaimer in his old patent of May 31, 1879, and all the other circumstances of the case, we must come to the conclusion that all that Reese practiced was merely experimental—no reduction to practical use giving any definite reliable results—and became abandoned and lost. We must, therefore, reverse the decision, and find Thomas entitled to the award of priority.

R. L. B. CLARKE, {  
H. H. RATES, { Examiners-in-Chief.

I agree with the Examiner of Interferences that the testimony fairly establishes that Reese made the invention in controversy and reduced it to practice as early as the year 1867. I also agree that under the ruling in *Harnett v. Reese*, 21 O. G., 1875, in which the same series of experiments were in evidence, a completed invention cannot be abandoned in favor of subsequent inventor. The benefit of such an abandonment can inure only to the public, and its existence is a question to be determined *ex parte*. I therefore dissent from the decision of the majority of the examiners-in-chief finding priority in Thomas.

ROBERT FISHER, JR.,  
Examiner-in-Chief.

It is understood that the representatives of Mr. Reese will now appeal the case to the Commissioner. The action of the Commissioner of Patents, whether in favor of Reese or Thomas, will be final. The decision cannot be reached under two or three weeks.

#### The Eastern Pig Iron Association and the Tariff.

The following memorial of the Eastern Pig Iron Association was presented to the Ways and Means Committee on the 6th inst.:

The Eastern Pig Iron Association respectfully and earnestly protest and remonstrate against the proposed reduction of the duty on pig iron and wrought scrap iron, and warn the committee and Congress of the alarming consequences certain to follow such reduction. The existing duty on pig iron and wrought and cast scrap iron is 1 cent per pound, or \$6.72 per ton; the proposed duty is 1/4 cent per pound, or \$5.60 per ton, with a limit of 50 per cent. ad valorem after January 1, 1887, which would be \$4.90 per ton on 40/ iron and \$3.68 on 30/ iron. From \$9 per ton the duty was reduced in 1871 to \$7, without any corresponding reduction on bar iron or other similar products of iron. When the tariff was revised in 1883 the duty on pig iron, in order to afford a fair proportionate rate of protection, should have been made \$8 per ton, as recommended by the Cresson convention of iron and steel manufacturers. Instead of this it was again reduced below the inadequate rate then existing, and now stands at \$6.72 per ton, as above stated.

The consequences of these reductions have been most disastrous. The manufacture of pig iron is in a very depressed con-

dition. Prices have fallen steadily to September, 1885, since when there has been a slight rally. There has been a most unequal competitive struggle between the foreign producers at low wages and the home producers at higher wages. One by one our furnaces closed and put out their fires, and many of those who continued the fight were driven into bankruptcy and ruin. With half of our furnaces idle and thousands of our workmen idle from want of employment, large quantities of foreign pig and scrap iron, and products of pig and scrap in a more advanced state of manufacture, have continued to arrive and supply our market to the exclusion of the home product. The sufferings and privations of the workmen and their families, and the extent of the losses of their employers thus wantonly sacrificed in favor of foreign capital and cheap labor, will never be definitely known.

Since these reductions most of the capital invested in these great industrial establishments has either ceased to be productive or has been sunk in the hopeless struggle with the products of underpaid foreign labor. As an instance of this, take the Lehigh Valley district, which up to 1871, when the duty was reduced from \$9 to \$7 per ton, was the most prosperous in the country. Situated in the midst of enormous deposits of good hematite ores, with an abundance of fluxes at their very doors, and the great Lehigh anthracite coal fields at the head of their valley, this region was properly regarded as one of the most favored. At about the time of this reduction, within a few miles of the center of this great ore deposit there were 38 blast furnaces in active and prosperous operation, which were operated by 14 different companies. In the struggle which followed the reduction of duty 11 out of these 14 companies were driven into bankruptcy, the whole of their original capital being sunk and lost, while two of the remaining three created mortgages against their plant amounting to \$50,000 to \$75,000 to each furnace. And this is practically paralleled in other sections.

The depression in the iron trade is not, however, confined to this country. Great Britain, with the ambition to supply the world, has built furnaces with a capacity far beyond her market. Being fenced out of the Continent by hostile tariffs, she has gone on accumulating stocks of unsold and unsaleable pig iron, till at the close of 1885 she had nearly 2,500,000 tons unsold—about one-third of her product for that year, 7,450,000 tons. This unsold British stock is a menace to the whole world. Continental nations have protected themselves against the British manufacturers, and their only hope for relief is a reduction in our tariff, to which they are now looking with anxious eyes. The British iron market rises and falls with their hopes of a reduction in our duties, with the prospects of the passage of the pending bill. The present prices of British pig iron range from 30/ to 48/; \$11.76, per ton, with exchange at \$4.90, as to-day. The lowest priced iron is so inferior as to be hardly saleable here at any price. It is only used in making the rotten bar iron which the British manufacturer works off on the savage African and the ignorant Chinese. The highest priced Summerlee Scotch is so rarely imported that it may also be disregarded.

At 40/ \$9.80, per ton a good English iron may be bought. If to this price at shipping port be added the present duty, \$6.72, the freight (now quoted at 5/ to 10/), but during the whole of last year ranging between 1/ and 2/), say, \$1.75, with commissions, insurance, and expenses, say, 40 cents, it will be seen that a good quality of British pig iron can now be laid down in Atlantic or Gulf ports at about \$18.67 per ton. Now the present average cost at furnace of American pig iron east of the Allegheny Mountains is between \$14 to \$16 for mill iron and \$16 to \$18 for foundry iron per ton, to which must be added about \$1.25 to cover freights and charges to market. It is evident, therefore, that on some grades there is little or no margin for profit even with the existing duty, and that any reduction of duty would practically close our works. One other subject must be referred to here, which is labor. It must be remembered that the cost of a ton of pig iron is almost entirely made up of labor. With the exception of royalties on iron ore, coal and limestone, profits on mining, and profits on transportation of the materials to the furnace, amounting in the average to about \$2 per ton of iron, all other cost is labor.

During these disastrous years, in our fruitless efforts to bring cost down to price we have at different times reduced wages till they are now at a point where no further reduction is possible. Our employees, aware of our heavy losses, and willing to bear their share, have submitted cheerfully. Both employers and employees have been holding on, hoping that the tide would turn, and that a moderate rise in prices would enable us to pay better wages and to recoup our losses. But, even if the present duty is maintained, any material rise is not probable in the present condition of the British iron trade. With any reduction, even the slightest, the hoped-for rise becomes absolutely impossible. If we had anything to hope for from the present Congress we would ask them to put the duty on pig iron at \$8 per ton, which is no more than would overcome the difference in wages paid abroad and at home. We would also ask that the duty on wrought scrap, which is a substitute for pig iron, and of which 1 ton is equal to 1 1/4 tons of pig iron, should be fixed at \$10.

To conclude, the makers of pig iron, so far as we represent them, are utterly weary of this continual nagging at the tariff. We have invested money in our business under a state of affairs as regards protection from foreign competition which warranted us to expect a fair business profit. The perpetual tinkering at the tariff paralyzes business, demoralizes trade, and has reduced most of us to such a state of mind that we would be glad to get back 50 cents on the dollar of our money invested. Between the proposed tariff and the abolition of all duties on pig iron we have no choice. In fact, we would prefer free trade to the proposed rate of duty, because we believe that the stronger the dose the more rapid will be the recovery of the patient.

## English Letter.

(From Our Regular Correspondent.)

LONDON, FEBRUARY 22, 1886.

#### THE WEEK

has been rather quieter from a public point of view than its immediate predecessors, although in some places there have been further troubles with those who either are really unemployed or seek to impose themselves upon a too trusting world as being out of work. In London the temporary scare has passed away, and those who wildly predicted an early revolution have been refuted by the severe logic of events and facts. The relief funds have grown to considerable dimensions, that of the Lord Mayor having reached about £50,000 (\$250,000) in less than a fortnight, while in many of the populous provincial centers very respectable totals have been subscribed. These funds are being distributed in a cautious manner, so as not to encourage idleness and vagabondism, but to afford relief and encouragement to real misfortune. In the same way various useful public works are being started and more are talked of around London and along the coast, in the shape of harbor improvements, embankments and the like. By these means relief will be given and occupation found for some thousands of men of the laboring classes and among those who are able to do manual labor. Even then it is to be feared that much distress will remain unrelieved and probably undiscovered among those, such as clerks, who cannot dig and are ashamed to beg, and who are very numerous among the unemployed. The reductions of wages are going on in various trades, and are largely being accomplished without strikes or lockouts, but on the Northern rivers the men in the shipbuilding trades are still on strike. These men, as I have pointed out on former occasions, have long been in the enjoyment of splendid wages, often running to £6 and £8 3/4 week—say \$30 to \$40—and now refuse to help their hard-pressed employers by accepting a drop of 10 to 15%. As one result they are idle and going to the dogs in all the senses of the phrase, while as another result their employers are losing orders. To day, for instance, Wigham & Richardson, of Hartlepool, write to say that an order for a steamer of 4000 tons which had been placed with them has been canceled and will be sent abroad—either to Holland or Norway. It is by these senseless strikes that British trade has been so seriously damaged. As in this instance, trade once diverted to other places is very hard to win back, and frequently never returns to the place whence it was rejected. Speaking of British trade brings me to the question of

#### GERMAN COMPETITION.

which seems to have assumed a vast amount of importance all of a sudden. Observant persons of various degrees have for many years known that the Germans were progressing with rapid strides in many departments of industry, but it seems that others have not been so watchful, and that they now learn with great surprise that the Teutons are a busy manufacturing race. Hence these fears. As I told you last week, there has been a tremendous (newspaper) outcry at Sheffield on the subject, chiefly on the part of a journal there which has long been suspected of a declining circulation, and is now accused of attempting a sensation. Anyhow, the matter has been written up from various points of view, and Sheffield manufacturers and merchants are broadly accused of importing large quantities of German cutlery and then sending it out under their own marks or labels. Chapter and verse are not given, but the journal in question indulges in a good deal of "we could and we would" writing, and has managed to get its version of affairs adopted by many of the daily newspapers which really know and care nothing of the real merits of the case. Personally, I will give every possible credit to the "unveilers of the mystery," except that I think they have used the "big brush" too freely. Nobody who knows the Sheffield trades well will deny that a good deal of German stuff is sent out, but it is not correct that it is sent away as being Sheffield made. The dodge would not work, in fact, for the very sufficient reason that the great majority of the British shopkeepers know quite sufficient of the goods they handle to distinguish between English and German products. The ironmongers and other retailers doubtless sell some German goods, but they do so knowingly, and only when they have failed to get English articles of equal or better quality at about the same prices. On the whole I think Sheffield is being grossly slandered in this connection, especially as there is no shadow of a doubt that nine-tenths of the foreign goods introduced into this market are brought in by merchants in London at Birmingham or Wolverhampton. These middlemen have no reputation to lose, and so long as they can get their profits it is clearly immaterial who gets their goods they handle. At the same time I would state that those who decry all German products as "rubbish" are seriously mistaken. Some very respectable metal work of one kind or another is turned out in Germany, and American as well as English firms will commit a most serious mistake if they underrate or fail to appreciate the real nature of German rivalry in the markets of the world.

#### THE IRON MARKET

has again been very dull and unsteady, with a decided downward tendency. At the end of last week Scotch warrants closed for cash at 38/3, the lowest price ever known. The stocks have increased, as in the previous weeks of the present year, and shipments, though a trifle better, are still below the average. The advent of spring is still eagerly anticipated, but the steadily-declining market is nipping the hopes of those—and their number was considerable—who believed that this year would usher in a better state of things. At Barrow and in West Cumberland no change can be reported, although, taken altogether, the condition is not materially worse, mixed lots being quoted at about 43/7 ton. At Middlesboro' the tone has been weak, and a decline has followed. Buyers are ready to place a lim-

ited quantity of work at their own prices, but only very small parcels change hands, for sellers, in spite of the market being against them, persistently cling to the hope that bottom prices must very speedily be reached, if they have not now been touched. No. 3 changed hands at Tuesday's market at 30/6, but not, as just remarked, to any great extent. In Staffordshire the condition, though emphatically unattractive, does not, it is held, exclude the hope of a revival at no distant date, but it is strongly represented that some readjustment of wages and kindred details must be effected before anything worth the name of improvement can be announced. The Swedish market has not advanced in the least, but, on the contrary, there is a marked downward tendency. The Indian market is flatter, and the Levant market, owing to the continued uneasiness as to a possible outbreak of hostilities between Greece and Turkey, remains perfectly stagnant. The Sheffield inquiries are comparatively feeble and unimportant, and America hangs back or only buys in small lots. To meet this condition the Swedes have lowered their quotations, but inquiries are not forthcoming even at that. Wire and galvanized iron are without alteration as to price, but hardly as good as last week as to demand. The question of restriction of output in galvanized iron is still unsettled and without the probability of its being disposed of just now. Scrap iron is a trifle easier, and rates are difficult to maintain. In the finished departments no improvement has been manifested, but it is a satisfactory feature that some of the wages questions have been settled amicably without either resorting to a strike or a lockout. The strike in the shipyards in the Cleveland district, however, continues, and the works in that vicinity are necessarily quiet and only indifferently employed. Prices quoted are: For ship plates, 90/ @ 92/6; boiler plates, 110/; girder plates, 95/; ships angles, 87/6; sheets, 120/, and common merchant bars, 92/6, all less 2 1/2% cash. In South Staffordshire best bars have changed hands at £7. 10/, and ordinary brands at £5. 5/ @ £6. Freights continue steady to New York, 7/6 @ 10/ still ruling for pig iron from Glasgow. Steel has been quiet but fairly firm, most of the works being tolerably well employed. Some 2000 spiral springs have been ordered by the Great Peninsular Railway from John Brown & Co., Limited, and about 400 tons of steel channels for Indian States wagons have been placed with the same firm. It is also believed that the Leeds Wheel and Cycle Co. have received orders from the Great Northern Railway Co. for 1000 sets of wheels and axles, and Harrison & Camm, Rotherham, have 200 sets of wheels and axles in hand for the Queensland Government. Railway steel rails have been in fair request during the week, but only in small quantities. Though individually unimportant they amount up to some 5000 or 6000 tons. They are nearly all for home railways. The Lancashire and Yorkshire Railway have placed 10,000 tons with the Barrow Co., and a further 10,000 tons with Cammell & Co., at the combination price, viz., £4. 15/. These, however, are for delivery next year. The order for the 2400 tons of tramway rails required by the Melbourne Tramway Trust has been secured by McLean Brothers & Rigg, of London, and Sydney, &c.

#### SCOTCH PIG IRON

has been extremely dull and weak, warrants having fallen to a lower level than ever before known, namely, 38 1/2 on February 19. They are still quite high enough, as judged from a non-speculative point of view. Makers' special brands are also easier, as they must be in view of the enormous stocks and the general quietude of the demand. There are now 92 furnaces in blast in Scotland, as against 94 a year ago. Connal's stores contain 680,366 tons—an increase of 1910 tons last week—as compared with 585,352 tons same date 1885. Shipments are 13,001 tons behind, and importations from Middlesboro' 18,119 tons less. Current values are:

Deliverable alongside.	No. 1	No. 2
Gartabherrie, at Glasgow.....	43/	42/
Coltuness, .....	47/	43/6
Langloan, .....	45/	43/
Summerlee, .....	47/6	43/
Calder, .....	46/6	42/
Carnbroe, .....	43/6	41/
Clyde, .....	44/	40/6
Monkland, .....	39/6	37/
Quarrier, .....	39/	36/6
Govan, at Broomeclaw, .....	39/6	37/
Shotts, at Leith, .....	46/	45/6
Carroll, at Grangemouth, .....	48/6	45/6
Kinnell, at Bo'ness, .....	45/	42/6
Glenargroek, at Ardrossan, .....	45/6	41/
Eglington, .....	39/6	37/
Dalmington, .....	42/	39/

#### THE HARDWARE TRADE.

In London business has not been troubled in the way it was last week by a repetition of the scare which caused half the retail firms in the principal thoroughfares of the city and many in other parts of London to close their establishments early in the afternoon. In comparison with last week the present week, therefore, has been a good one. In the home counties traders do not appear to have been doing much lately, and as regards export the recent mails have brought nothing beyond what might be considered fairly normal order sheets. At Birmingham, that there is a considerable amount of distress is undeniable, but it is not abnormal. The pauperism returns are less than at this time last year, wages sheets show no appreciable falling off, and the demand for workpeople is quite up to the average of the season; in some branches, indeed, skilled labor is reported scarce. Manufacturers generally report that business is looking up, but slowly, and prices are kept down by competition. Striking testimony to the severity of foreign competition is afforded by Nettlefold's announcement of an advance of 5% in the pound upon iron wood screws, which is equivalent to a reduction of 20% on the net. Unless the German screw makers are prepared to make a corresponding reduction in their quotations, which seems hardly possible, they will scarcely be able to hold the ground they have been slowly winning in this country. In foreign markets, of course, they will have to fight special discounts adapted to the circumstances. At Sheffield the extent to which the want of employment affects this district has been in some measure brought to the surface by the epidemic of demonstration which is running through the country.



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## Aviation.

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## Asbestos.

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## Augers and Bits.

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S. Obermayer Foundry Supply Mfg. Co., Cincinnati, O. 15  
Fountain Pen, Bradley & Co., Syracuse, N. Y. 48  
Buffalo Forge Co., Buffalo, N. Y. 14  
Bullock T. B. & Co., Detroit, Mich. 41  
Empire Portable Furn. Co., Cohoes, N. Y. 44  
Frambanks & Co., 311 Broadway, N. Y. 15  
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Buffalo Forge Co., Buffalo, N. Y. 14  
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## Special Notices.

## RECENT BOOKS.

Smith, R. S.—Manual of Topographical Drawing. Revised and enlarged. \$3.  
 Paine, C.—The Elements of Railroad Engineering. \$1.  
 Carpenter, W. L.—Treatise on the Manufacture of Soap, Candles, Lubricants and Glycerine. \$4.  
 Fontaine, H.—Electrolysis: a Practical Treatise on Nickeling, Coppering, Gilding, Silvering, the Refining of Metals and the Treatment of Ores by means of Electricity; from the French, by A. Perley. \$3.50.  
 Kunhardt, C. J.—Small Yachts: their Design and Construction. Exemplified by the Ruling Types of Modern Practice. \$7.50.  
 Reeves, R. H.—Bad Drains and How to Test Them; with Notes on the Ventilation of Sewers, Drains and Sanitary Fittings, and the Origin and Transmission of Zymotic Disease. \$1.40.  
 Halsted, G. B.—The Elements of Geometry. \$1.75.  
 Putnam, J. P.—Lectures on the Principles of House Drainage. 75 cents.  
 Cutler, H. A., and Edge, F. J.—Tables for setting Out Curves from 100 feet to 5000 feet radius; useful for setting out roads, sewers, walls, fences and general engineering work. \$1.  
 Troilux Magnus—Notes on the Chemistry of Iron. \$2.  
 Hamilton, J. A.—Architects' and Stairbuilders' Tables of Treads and Risers. 50 cents.

Sent, postpaid, on receipt of the price by

DAVID WILLIAMS,

Publisher and Bookseller,

66 and 68 Duane St., New York.

TO Parties who would like to invest in a good, safe business: Any party or parties with means who would like to engage in a thoroughly staple business—to wit: the manufacture of Malleable and Gray Iron, Steam, Gas, Water Fittings and General Castings. We have an entire new plant, within four hours' ride of New York, consisting of three acres of land, two large foundries and large finishing shop, all of brick and fully equipped. Also a full and complete line of Patterns for Malleable and Cast Iron Fittings, with a large stock of goods on hand. Parties now owning the above have not sufficient capital to carry on the business. Works can be started and in full running order inside of ten days. Situated on two main lines of railroad, and shipping rates as cheap as from any main shipping point. The entire works were built in 1884, in the most substantial manner, and all especially adapted and intended for this business, being the most complete, best fitted and arranged of any in the country. The above will be gladly shown, and all other information given to persons desiring. Address for two weeks.

P. O. BOX 263,  
Waterbury, Conn.

## WANTED.

A second-hand Planer, about 20 in. x 20 in. x 4 and 5 ft. Address, giving make, full description, lowest price and where it can be seen; also how long used and present condition.

P. O. BOX 184,  
McKeesport, Pa.

## Tapping Machine Wanted.

Wanted—A good second-hand Tapping Machine for tapping fittings, No 3 Saunders' Sons make. Address, with full particulars as to how long in use, where to be seen and bottom cash price, "C. W. M."  
105 South 21st Street, Philadelphia.

SITUATION WANTED.—A position as Traveling Salesman for a wholesale hardware or any other legitimate business; 34 years old; married; have had three years' retail and three years' wholesale experience in hardware; was partner in wholesale hardware; has accumulated property; can give full and complete references; was on the road from 1882 to 1885; have extensive hardware acquaintance in Ohio and Indiana, Southern Michigan, Western New York and Pennsylvania; Southern Kentucky. Reason for going on road, cannot bear confinement. Address "TRY SQUARE," Office of The Iron Age, 66 and 68 Duane Street, N. Y.

## WANTED.

To buy STOCKS OF GOODS, PARTS OF STOCKS, JOB LOTS, &c., Cheap for Cash, of Hardware, Tinware, Woodware, &c., &c.

"CASH BUYER,"

Office of The Iron Age, 66 and 68 Duane St., N. Y.

Western Agency Wanted at St. Louis, Mo.,

of one or more lines of goods to represent in Western Territory, by a party of high standing, ability and large acquaintance. Past experience associated with Hardware and kindred industries. The best qualifications furnished, and nothing but a first-class arrangement entertained. Moderate capital invested if to advantage.

"AGENT," Room 20,  
Gay Building, St. Louis, Mo.

SITUATION WANTED.—By a first-class Metal Pattern Maker; one who thoroughly understands the business and can furnish the best of reference as foreman or journeyman on Hardware and Brass or Malleable Iron.

"P. O. BOX 106,"  
Bridgeport, Conn.

WANTED—A Hardware man, 15 years' experience, wants position as Buyer, Salesman or Traveler. Competent to fill any position; Wholesale or Retail. Best of reference. Address QUICK.

Office of The Iron Age, 66 and 68 Duane St., N. Y.

FOR SALE.—Several thousand tons Charcoal Ore Chert, 30 per cent. iron; practically no sulphur or phosphorus; and 30 new W. I. Coil Blast Furnace Tappets, large size, &c., each supply.

"CHARCOAL CINDER,"

Office of The Iron Age, 66 and 68 Duane St., New York.

ENGAGEMENT wanted by experienced Salesman acquainted with Eastern trade of New York City, New England and Middle States.

"JOHN,"

Office of The Iron Age, 66 and 68 Duane St., N. Y.

AN experienced Roll Turner and Machinist desires a situation. Would take position of Master Mechanic and Roll Turner if the Mill were small.

"ROLL TURNER,"

Lock Box 1086, Phila.

SITUATION WANTED, by a competent Hardware man with twenty years' experience in shelf and Heavy Hardware, Stoves, Tinware, &c., in store or to travel for a good house. Best of references. Address "M. A. W.,"

Box 155, St. Thomas, Ont., Canada.

WANTED.—A young man of marked ability who has had experience, to act as buyer and to be otherwise entrusted with important responsibilities, by a large concern. Salary liberal. Address with full details as to experience, age, reference, &c.

Office of The Iron Age, 66 and 68 Duane St., N. Y.

## WANTED.

A good second-hand Iron Lathe, 5 or 6 foot bed must be in good condition and cheap.

"POOR & WOULF,"

Black River, N. Y.

## Special Notices.

## HAYDOCK &amp; BISSELL,

Wholesale Auctioneers,

## TRADE SALE

OF

Table and Pocket

Cutlery,

Commencing on Thursday, March 18th,

At 10 o'clock, at

83 Chambers and 65 Reade Sts., New York.

Comprising a large line of Table Cutlery, desirable patterns, in Bone, Ivory, Rubber, Ebony and Cocoa, first and second quality, direct from the manufacturers. Also a large assortment of Carvers, Butcher Knives, Pocket Knives, Shears, Scissors, &c., &c. Also Silver Plated Tea and Table Spoons and Forks, extra and triple plate on eighteen per cent Nickel Silver. Also 125 Lots of Fine Table and Dessert Knives, very fine pairs and sets of Pearl, Ivory, Stag and Walnut Carvers, in Morocco and Plush Cases, which goods were in the New Orleans and Chicago Expositions, and are very desirable for fine retail trade.

## NOTICE.

Sale—Stove and Hollow-Ware Works, Philadelphia.

On Monday morning, March 22d, 1886, at 11 o'clock, all the Real Estate, Machinery, Patterns, Stock and Good-Will of the Stove and Hollow-Ware Works of

STUART, PETERSON & CO.,

At the northeast corner of

Broad and Noble Sts., Philadelphia,

will be sold on the premises at public sale.

The property and plans of same can be seen on application at the works, where information respecting same will be given.

RICHARD PETERSON,

Surviving Partner.

BLACK RIVER FALLS,

WISCONSIN,

Offers splendid opportunities to parties with capital wishing to engage in manufacturing. Excellent water-power. Plenty of hard and soft timber. Rich Iron Mines recently opened. The largest charcoal Iron Furnace in the United States just completed.

Extensive Granite Beds now being developed.

Write to secretary Board of Trade for full information.

## For Sale.

Almost a complete outfit for Hollow-Ware Foundry:

Skillet Grinder, with Chucks almost new.

Skillet Patterns, Nos. 7, 8, 9, 10, 11 and 12.

Nos. 7, 8 and 9 Tea-Kettle Patterns, with Iron Flasks, Yanks and Scotch Bowl Patterns.

Nos. 5 and 6 Straight Pot Patterns.

Nos. 7, 8 and 9 Deep Long Pan and many other Patterns, very valuable.

Can be bought at very low figures, to close up a business.

Address, naming prices you will pay,

J. ABLETT,

Duquesne Way and 8th St., Pittsburgh.

## FOR SALE.

One Stack; made by Tippet & Wood last September; 38 feet long, 33 inches diameter, of 3/4 iron. New York or Boston delivery.

KATAHDIN CHARCOAL IRON CO.,

Bangor, Maine.

## FOR SALE.

Iron Stack for Blast Furnace; 23 feet diameter, 56 feet high; was put up, but never used; is in good order; can be seen at Charleston, West Va. Also Saw Mill and Screw-Cutting Machine, three brick buildings, eight acres in city of Charleston, West Va.; steamboat landing on premises; new railroad. Address

A. W. FELLOWS,

Wilkesbarre, Pa.

## For Sale.

One 600-pound Steam Hammer.

Two Lewis, Oliver & Phillips' Bolt Headers.

All nearly new, and in first-class condition.

Address AJAX FORGE CO.,

Chicago.

FOR SALE.—A manufacturing business of Metallic Articles and Light Machinery in full working order and now running. Satisfactory reasons for selling. Price \$6000.

Address "OPPORTUNITY," P. O. Box 285,  
New Brunswick, N. J.

A Rolling Mill Superintendent or Manager, with a practical knowledge of puddling and the finishing of all classes of iron, and possessing a thorough knowledge of the Open-Hearth process, is open for an engagement. Has a practical knowledge of the manufacture of Boiler, Tank and Ship Plates, Pine Sheets for Stamping purposes, Galvanizing, &c. Also all descriptions of Guide and Merchant Steel, Iron and Steel Forgings. Address "IRON AND STEEL,"

Office of The Iron Age, 77 4th Ave., Pittsburgh, Pa.

## Wanted.

A Partner in the Hardware business, with \$10,000 capital, active or silent, guaranteeing 20 per cent. net profit, in a town centrally located in Dakota. Now doing a fine jobbing as well as retail trade. With additional capital trade can be increased to \$100,000 per year. Best of references required. Address "XENIA,"

Office of The Iron Age, 66 and 68 Duane St., N. Y.

TO CAPITALISTS AND MANUFACTURERS.

A rare opportunity to invest about \$50,000 in an established Manufacturing Business where Agricultural and other implements are made. Located in an extensive Agricultural district in a growing town of California. The business has been running three years; has an eligible site, Land adjoins depot grounds of a prosperous Railroad. Address "CALIFORNIA,"

Office of The Iron Age, 66 and 68 Duane St., N. Y.

## Special Notices.

## ENGINES &amp; BOILERS.

NEW AND SECOND-HAND.

The following new Slide Valve Engines guaranteed complete and first class:

One 10 x 12. One 10 x 12. One 10 x 12.

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## Special Notices.

## SECOND-HAND MACHINERY

In Good Order. For Sale Cheap.

Engine Lathe, 48 in. x 20 ft. bed.

Engine Lathe, 36 in. x 18 ft. bed







# Trade Report.

## New York Iron Market.

A lull has come over the markets of Iron and Steel during the past weeks, thus culminating a period of dullness since the beginning of the year. The enthusiastic hopes entertained by many during the last two months of 1885 have not been realized, and, while there is a widespread feeling of confidence in the future, the opinion is gaining ground that the progress initiated last year will be at a much slower rate than even conservative members of the trade felt disposed to predict. In some departments whatever advance was secured is now lost, but these are only a few exceptions. Wherever speculation played an important part there has been a collapse, or at least a strong retrograde movement. In Foundry and Forge Irons, so far as tidewater markets are concerned, the moderate advance established is tenaciously held, and even those who must suffer from it, the producers of Manufactured Iron, freely admit that there is no prospect of a decline whatever. Manufactured Iron has, on the whole, moved upward very little, if at all, and this has placed the makers in the embarrassing position of being unable to obtain an advance corresponding to the higher cost. It is in this branch that an upward tendency must first develop before the trade can be considered to be on a sound basis. As we pointed out at the time, much of the great activity toward the close of last year was due to an exceptional anticipation of the demand for Rails, then produced by purely artificial means. A period of comparative dullness must and did follow, but it would be as little correct to draw erroneous conclusions from the latter as it was dangerous to overestimate the effect of the former. The quiet state of business now is more apparent than real. We know that consumption is very heavy, and that buying at this moment is retarded by a number of circumstances temporary in their character.

**American Pig.**—The market is quiet, but firm. The assertion is made that prices are relatively higher in Philadelphia than they are here, and that Iron is being diverted into that market. Here efforts to get any better prices on sales of current small lots have failed. Virginia Iron is going into store, as efforts to get \$18 @ \$18.25 for No. 1 Foundry in small lots have been unsuccessful. A lot of 2000 tons of Charcoal Pig, closed out by a Georgia furnace to be remodeled to use Coke, has been bought on speculation at a round figure, and not finding buyers is going into store. We quote for standard brands, tidewater delivery, \$18 @ \$18.50 for No. 1 X Foundry, \$17 @ \$17.50 for No. 2 X Foundry, and \$16 @ \$16.50 for Gray Forge. Outside brands are 50¢ below these quotations.

**Scotch Pig.**—Importers look for easier freights in the near future, because the Anchor Steamship Line has decided to run steamers weekly after the 1st of April instead of every two weeks, as hitherto. This with the weekly steamer of the State Line makes two steamers every week. We quote nominally as follows for small lots: Coltness, \$20.50 @ \$21 to arrive; Gartsherrie, \$20 @ \$20.50 to arrive; Shotts, \$20.50 @ \$21 to arrive; Carnbroe and Gleggarnock, \$19.50 to arrive; Summerlee, \$20 @ \$20.50 to arrive; Dalmellington, \$19 @ \$19.50 to arrive; Eglington, \$18 @ \$18.50 to arrive, and Clyde, \$18.50 @ \$19 to arrive. Concessions are made on 100-ton lots.

**Bessemer Pig.**—We hear of no business. Offerings of Domestic Bessemer Pig are quite liberal. We quote Foreign nominally \$19 ex-ship, and Domestic \$18.50 @ \$18.75 at furnace.

**Spiegelisen.**—There is no demand, and the market is weak; 20% English Spiegelisen is nominally quoted \$27, and German \$26.50. Ferromanganese is quoted \$67.50 @ \$68 for 80%.

**Bar Iron.**—The market is dull. We quote for delivery here in round lots: Common Iron, 1.65¢ @ 1.70¢; Medium, 1.70¢ @ 1.75¢; and Refined Iron, 1.85¢ @ 1.90¢. Store prices are 1.75¢ @ 1.80¢ for Common, 1.85¢ @ 1.90¢ for Medium, and 1.90¢ @ 2.25¢ for Refined.

**Structural Iron.**—There is considerable work in sight, but little has yet been closed. Prices are stationary. We quote for Angles 2½ @ 2.10¢, delivered, and Tees at 2.35¢ @ 2.40¢ for round lots. Steel Angles are quoted 2.35¢ @ 2.45¢, according to quality. Store quotations remain 2.25¢ @ 2.45¢ for Angles, and 2.6¢ @ 2.7¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders.

**Plates.**—We quote for round lots: Common or Tank, 2½ @ 2.1¢; Refined, 2½ @ 2.3¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.4¢ @ 3.5¢; Extra Flange, 4¢ @ 4.1¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2½¢ at mill asked; Boiler, 3½¢ for Shell, 3½¢ @ 4¢ for Flange, and 4½¢ @ 5½¢ for Extra Flange and Fire-Box.

**Merchant Steel.**—At a meeting of the Steel Manufacturers' Association in Pittsburgh last week some irregularities in the base prices, of which some works have been guilty, were adjusted by adopting the rule that the reduction of ½¢ @ ¾¢ on quantity orders shall apply to all orders of 1000 lb and upward. There is considerable inquiry for

Tire Steel. Quotations for the range from ordinary to good grades are as follows: American Tool Steels, 7½¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; English Tool, 13¢ @ 15½¢; common grades, 7¢ @ 9¢; Crucible Machinery, 4.5¢ @ 6¢; Round and Flat Spring, 2.6¢; Round-Edge Tire, 2.6¢; Square-Edge Tire, 2.9¢; Too Calk, 2.7¢; Sleigh Shoe, 2.8¢; Open-Hearth and Bessemer Machinery, 2.8¢, with freight allowance.

**Steel Wire Rods.**—The market is quiet and slightly drooping. We hear of sales for May, June and July shipment. We quote nominally \$41.25 @ \$41.50.

**Steel Rails.**—During the week there have been sales by Eastern mills of lots aggregating about 13,000 tons, partly for Eastern and partly for Western delivery, at prices ranging from \$34 to \$34.50 at mill. As yet very little work has been taken for fall delivery.

**Old Rails.**—The market is exceedingly dull, and is weaker. Sellers are asking in vain for bids. We hear of two Southern railroads alone which have to offer 27,000 tons between them, and the receipts of foreign material still continue. During the week bids were asked in vain for a lot of 11,000 tons of English T's for immediate shipment. We quote American and English T's and Foreign Double Heads nominally \$21 @ \$21.50.

**Scrap.**—The market is weaker. Foreign, ex-ship, offering at \$20 @ \$20.50. We hear of no sales.

**Rail Fastenings.**—There has been some irregularity in the West in Angle Bars. We quote Spikes nominally 2.40¢; Angle Fish Bars, 2¢; Bolts and Square Nuts, 3¢, and Bolts and Hexagon Nuts, 3.25¢, delivered.

## Metal Exchange.

The following sales are reported:

WEDNESDAY, March 3.	
5 tons Tin, spot.....	20.70¢
THURSDAY, March 4.	
10 tons Tin, March.....	20.70¢
FRIDAY, March 5.	
5 tons Tin, March.....	20.70¢
MONDAY, March 6.	
5 tons Tin, March.....	20.70¢
5 tons Tin, April.....	20.70¢
10 tons Tin, April.....	20.75¢
TUESDAY, March 9.	
200 boxes Tin Plates, June.....	4.27¢

## Philadelphia.

Office of The Iron Age, 200 South Fourth St., PHILADELPHIA, March 9, 1886.

**Pig Iron.**—Changes during the week have been very slight, and, although continued dullness has prevailed, buyers have obtained no advantages whatever. There is very little demand, and those who happen to have iron to sell report the market as being very flat. Its strength, however, and the scarcity are shown in the almost entire absence of all the leading companies as sellers. It may be hard to place such brands as are immediately available, but it would be a great deal harder to go into the market and pick up several hundred tons each of a few leading brands. Within the past ten years it may be safely said that there never was in all that time as little iron offering as there is to-day. Yet there is no great anxiety to buy. Consumers are supplied for the present, and beyond that both buyers and sellers appear to be quite indifferent. One reason for this probably is because consumers of Pig Iron have not been able to realize advances on their goods at all in proportion to the increase in cost of production; consequently, they are not disposed to place orders for material at the advance which sellers would be certain to ask for forward deliveries. On the other hand, makers have nothing to gain by pushing sales. They have no stocks to trouble them, while their current production, which is nearly all under contract, goes direct into consumers' hands. The idea is that when present contracts are completed buyers will be just as anxious to renew them as sellers are. In the majority of cases a decided advance will have to be paid, as deliveries under purchases made some time ago are probably at not over \$16 for Gray Forge and \$18 for No. 1 Foundry. Sales, such as have been made of late, average nearly, if not quite, a dollar more than the figures named, and, unless there is some entirely unforeseen change in the position, renewals will have to be made at an advance of about \$1 ¾ ton. The objection that buyers make to higher prices, as already stated, is that they cannot afford it, because an advance for their goods cannot be obtained. The absence of new transactions, therefore, is not because consumption is falling off, but because buyers postpone purchases until absolutely forced into it, while, on the other hand, sellers are confident that as contracts expire they can be renewed at figures which they do not at present consider it good policy to urge. In the meantime, as we have said, there is scarcely anything doing except in small lots and at very full prices, say \$16.75 @ \$17.25 at tide for standard brands of Gray Forge, \$17.50 for No. 2 and \$19 for No. 1 Foundry. Special brands command from \$1 to \$1.50 more, all grades except No. 2 being scarcer than for years past.

**Foreign Iron.**—There is some little inquiry for special brands of Open-Hearth Steel, but at figures which have not been met so far, although sellers are anxious for business. Bessemer is offered at \$19.50 @ \$20, and 20% Spiegel at \$26.50, with a pos-

sibility of slight concessions being made on firm offers for good-sized lots.

**Blooms.**—There is quite an active inquiry for Steel Blooms, with sales of both Foreign and Domestic at about the following figures: Slabs for Nail Plate, \$30 at tide for Foreign and \$30 at mill for Domestic, and from that up to \$35 for higher qualities; special grades for Boiler Plates and other uses requiring high tensile strength have been sold at from \$38 to \$40. Other Blooms as follows, and firmly held: Charcoal Blooms \$53 @ \$54; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$34 @ \$35, and Ore Blooms, \$35 @ \$36.

**Muck Bars.**—There is a good demand, but there are very few Bars for sale at prices generally bid. Sales have been made at prices ranging from \$29 to \$30 at mill, some asking still higher figures for first-class Bars.

**Bar Iron.**—This department of business is in a most unsatisfactory condition, cost gradually increasing, without the slightest prospect of relief in that respect. Prices, however, show a tendency to slide off, placing manufacturers at a serious disadvantage. It is difficult to suggest a remedy, although to outsiders it seems as though an advance in prices is inevitable in the long run. Pig Iron and Fuel are not likely to be lower, labor certainly will not be lower, and, as they may all be higher, it is difficult to see any way by which iron can be made to sell at less than present prices. Nevertheless, for the time being prices are a shade easier and orders hard to get unless by making concessions of from 2½¢ to 5¢ @ 100 lb, and even then the demand is not large. The mills are full of work, however, for some time to come, and, although buyers are extremely cautious, there is no reason to suppose that consumption is falling off, so that the demand, if not for large lots, is likely to be well sustained. Quotations are: 1.85¢ @ 1.9 for Best Refined Bars; 1.7¢ @ 1.8¢ for Medium, and 1.82½ @ 1.85¢ for Skelp Iron.

**Plate and Tank Iron.**—The demand has been rather light during the past week, but mills have plenty of orders to go on with for some time to come. The feeling is less buoyant, however, and on the chance of a good-sized order there is little doubt that slight concessions could be had from quoted rates, which are about as follows: Ordinary Plate, 2½ @ 2.1¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Shell, 3.25¢; Flange, 3.5¢; Fire-Box, 4¢.

**Structural Iron.**—There is no demand for anything but small lots, and, although the mills are tolerably well employed, there is some anxiety to secure new business. Inquiries do not indicate anything important as near at hand, but the current demand is of a pretty liberal character, so that, without being crowded, there is likely to be at least a fair average business. Prices steady as last quoted, viz.: 2½ @ 2.05¢ for Angles; 2.1¢ @ 2.2¢ for Bridge Plate; 2.4¢ @ 2.5¢ for Tees, and 3¢ for Beams and Channels.

**Sheet Iron.**—Some of the mills have entered a large amount of business at full prices without the least effort, while others have been offering freely at low figures. There is a disposition on the part of consumers to discriminate in quality; hence the better class of iron holds its price readily, while others are irregular and weak. We quote as follows:

Best Refined, Nos. 26, 27 and 28.....	4 ½
Best Refined, Nos. 18 to 25.....	3 ½
Common, ½¢ less than the above.....	3 ½
Best Bloom Sheets, Nos. 26 to 28.....	5 ½
Best Bloom Sheets, Nos. 22 to 25.....	4 ½
Best Bloom Sheets, Nos. 16 to 21.....	4 ½
Blue Annealed.....	3 ½
Best Bloom, Galvanized, discount.....	60
Common, discount.....	65

**Steel Rails.**—The mills are so full of business for the next three or four months that they are in no condition to take new orders; hence there is very little to report for the present. Prices are firm, with \$35 as the ruling price for such small orders as are taken for early delivery, and about \$34.50 for those of a later date. The feeling is one of great firmness, and, in view of the large amount of business still in sight, somewhat higher figures before midsummer are not improbable.

**Old Rails.**—Business has been very dull of late, as buyers show no disposition to make offers for large lots. Spot lots are in light supply, but there are a good many Rails afloat, and arrivals are expected to be somewhat heavy within the next 60 days. Prices are nominal at about \$21.50 @ \$22 for March deliveries at interior points. Bull Heads are offered at \$22.50 for arrivals in April, with that bid for deliveries within 10 days.

**Scrap Iron.**—Market steady, but quiet, at about the following prices: No. 1 Wrought Scrap, \$20 @ \$22; No. 2 do., \$14 @ \$15; Turnings, \$14 @ \$14.50; Old Car Wheels, \$16 @ \$16.50; Old Steel Rails, \$20; Fish Plates, \$23.50 @ \$24.50; Cast Scrap, \$14.50 @ \$15; do. Turnings, \$10 @ \$10.50.

**Hardware.**—Inquiry as to the business of the past week shows a little falling off. The only reason assigned for this state of things is that it is the logical effect of the last great blizzard. Lasting as it did for several days, outside work was suspended and orders for material held back in consequence. It has in no sense whatever affected unfavorably that confident feeling which has prevailed for some time back, but it is looked upon as merely a temporary check. The general expression is that of satisfaction with the

business now being done and belief that a very few weeks will largely increase the volume. Prices along the entire line are very firm.

**Wrought-Iron Pipe.**—We can note no change as compared with last week. There is but little new business, the demand being limited to present needs, and is very light. The market continues steady at about the following discounts for large lots: Lap-Welded Black, 60¢; Butt-Welded Black, 42½¢; Butt-Welded Galvanized, 32½¢; Lap-Welded Galvanized, 42½¢; Boiler Tubes, 55¢.

**Nails.**—The volume of business has enlarged during the past week, though made up of orders for small lots. The large orders for spring stocks are not being placed as yet, and sales are confined to what are needed for immediate use. Inquiries from the West continue to come in, but orders do not follow in proportion. In the meantime the market is very firm, and no sales are reported at less than quoted prices, which are based at \$2.50 for ordinary lots, and 10¢ off for carload.

**Hardware Specialties.**—In addition to orders for odd work, which are reported very plenty, the foundries are running full on stock for the coming season. Manufacturers say that regular goods are not being moved in large quantities, though the amount of business is very satisfactory for the season. Prices of specialties have not suffered to the same extent as those of staple articles; consequently, no great advance is looked for, notwithstanding the cost of production has increased by advance in wages. The feeling is one of confidence that an active business will prevail during the coming spring.

## Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., March 9, 1886.

There has been no important change in the general business situation during the past week. The outlook in some respects is encouraging, while in others it is not. Labor troubles are still of an almost every-day occurrence hereabouts; scarcely a one strike terminated before another is commenced, and boycotting is now the order of the day. It is very evident that this is destined for some time to come to be one of the live issues of the day. Both the press and pulpit have taken it up, and it is to be hoped that some good will come therefrom. The agitation of the tariff is severely censured as being productive of much more harm than good. Nearly all the labor associations either have already or will hold meetings for the purpose of protesting against Congress agitating the matter any further. Even those who are liberal in regard to their views of protection, and who contend that there should be revision, are opposed to agitation at the present time.

**Iron Ore.**—There is nothing new to report in connection with the Ore interest, with the exception that the consumption is increasing, many furnaces that were banked for want of Coke having been started up again; but there is no particular activity, a good many furnaces having a very fair supply; some of them have made contracts to cover several months to come.

**Pig Iron.**—We can report a fairly active and firm market; there has been an advance of 25¢ @ ton on Gray Forge Irons within the past two weeks, which we now quote at \$16 @ \$16.25, cash. A city furnace sold 1200 tons at the outside quotation, \$16.25, cash. The cost of production has been increased by an advance in the price of Coke, and it is now rumored that freights on Ores from the Lake are to be advanced. All kinds of furnace labor have advanced about 10% within the past few weeks, so that in reality the recent improvement in the price of Pig Iron has been pretty well covered by the increased cost of production. Quotations may be fairly given as follows:

Neutral Gray Forge.....	\$16.25 @ \$16.75, 4 mos.
All-Ore Forge.....	17.00 @ 18.00, 4 "
White and Mottled.....	18.50 @ 19.00, 4 "
No. 1 Foundry.....	18.00 @ 18.50, 4 "
No. 2 Foundry.....	17.00 @ 17.50, 4 "
Foundry Charcoal.....	21.00 @ 24.00, 4 "
Cold-Blast Charcoal.....	25.00 @ 27.00, 4 "
Bessemer Iron.....	20.00 @ 20.50, 4 "

We can report sales of 500 tons Southern Cold-Blast Charcoal at \$25 @ \$25.50, cash, and rumors prevail of sales of 6000 to 7000 tons of Bessemer having been made, but thus far the price has not leaked out. We suspect that it is in the neighborhood of \$19.50, cash.

**Muck Bar.**—We can report sales at \$28, cash, and \$28.50, four months, with more inquiry, and the market is firm at our quotation.

**Manufactured Iron.**—There is a fair business; some of the mills are pretty fully employed, while others are not. There is a very general complaint, however, in regard to prices, which for ordinary Merchant makes are unremunerative. While we continue to quote on a basis of 1.70¢ @ 1.75¢ for Bars, we hear of sales being made a good deal below our quotations, but there is a great difference in quality. Some consumers, and jobbers as well, prefer to pay the difference for first quality iron, and there is a difference of from ½¢ to ¾¢ between that made out of good Pig Iron and Old Rail Iron. Some buyers will not have Old Rail Iron at any price.

**Nails.**—The Nail situation here remains unchanged, but there are indications that it will be brought to a close before long—that a compromise will be effected. The great

obstacle to an adjustment between the manufacturers and the striking nailers is in regard to the non-union nailers at work. The manufacturers do not feel like discharging the non-union nailers, which will probably be insisted upon. The Western Nail Association meets at Cincinnati tomorrow, when possibly some action will be taken in regard to the strike. It is surmised by some of the knowing ones that the Wire Nail will supplant the Cut Nail before long, and so soon as it does the occupation of the nailer will be a thing of the past.

**Wrought-Iron Pipe.**—This important interest continues much the same as noted for some weeks past; mills are all busy and likely to be all this year. The regular monthly meeting of the Pipe Association took place in New York on the 7th inst. Prices firm, but unchanged. Discount on Black Butt-Welded Pipe, in carlots and upward, 45¢; less than a carload, 42½¢; Galvanized do., in carlots and upward, 35¢; less than a carload, 32½¢; Black Lap-Welded Pipe, in carlots, 62½¢; less than a carload, 60¢; Galvanized do., in carlots, 45¢; less than a carload, 42½¢; Boiler Tubes, 55¢ off; 2-inch Oil-Well Tubing, 13¢ @ foot net; 5½-inch Casing, 40¢; 8-inch Drive Pipe, \$1.30.

**Old Rails.**—The dullness noted in the Old-Iron Rail market for some time past continues; there have been no sales reported for several weeks, in the absence of which we quote nominally at \$23 @ \$23.50; they are being offered at \$23.50 without finding takers. Old Steel Rails also dull; may be quoted at \$22.50 @ \$23 for short or mixed lengths, and \$23.50 @ \$24 for long lengths. It is expected that a good many Old Rails will be lifted within the next month or two, which is not without its effect in depressing the market at present. Consumers look for still lower prices, and will buy none as long as they have any on hand. Some of them are well stocked.

**Steel Rails.**—There is an increasing inquiry, and the market may be quoted firm at \$35 @ \$35.50, cash, at mill.

**Steel.**—The mills are all pretty well employed; some of them have all they can do, but there is still considerable complaint in regard to prices. Standard brands of Refined Cast Tool Steel, 8½¢; Crucible Machinery, 3¼¢ @ 4¢; Open-Hearth do., 2½¢ @ 2¾¢; Bessemer Blooms and Billets, \$33 @ \$35 @ ton. None of the mills here are in condition to take orders for Nail Slabs, but there is not much inquiry. Steel Rail Ends scarce and held high—\$23; Bloom Ends, \$22 @ \$22.50.

**Railway Track Supplies.**—Spikes unchanged at 2.40¢, 30 days, delivered. Splice Bars, 1.70¢ @ 1.75¢; Track Bolts, 2 75¢ with Square and 2.85¢ @ 3¢ with Hexagon Nuts.

**Old Material.**—No. 1 Wrought Scrap remains unchanged at \$20 @ net ton; Old Car Axles, \$24 @ \$25; Wrought Turnings, \$14 @ \$15; Cast Boring, \$12 @ \$12.50, gross; Old Car Wheels, \$16 @ \$17. Altoona-made Wheels will not bring \$1 @ ton as much as other makes, owing to a mixture of Steel in them.

**Coke.**—Blast-Furnace Coke has been advanced 15¢ @ ton, and we now quote at \$13.50 @ ton at ovens. There are rumors of a further advance next month.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St., COR. LAKE ST., CHICAGO, March 8, 1886.

**Hardware.**—A continued increase in the demand for all kinds of Hardware is reported by jobbers. The pleasant weather made outdoor work possible on farms and new buildings, which materially enlarged the sale of Shelf Goods and Agricultural Implements. The annoying feature of the week is the strike on the Gould railroads, which interferes with shipping goods to the territory in which trade has been the most active in Barb Wire, Steel Goods, Nails, Merchant Iron and Wagon Material. While there is some increase in the profit on goods sold as compared with last year, there is, nevertheless, considerable cutting on the part of salesmen. Complaints are frequently heard of and remedies suggested for their better control, but no system or series of resolutions can improve the situation so long as these concessions are made with the knowledge and consent of the houses they represent. The non-uniformity of freight rates has been an advantage to jobbers, and some heavy sales have been made for shipments into territory where, under former tariff rates, it would have been impossible. At present it would seem that all lines of business, even extending into the delivery of goods, are done upon irregular, broken and distracted rates, which have their advantages and disadvantages. Nothing of any great importance directly connected with the Hardware trade has occurred during the week, and the market in a general way is regarded as steady and improving.

**Barb Wire.**—The situation of the market seems conflicting, inasmuch as each dealer appears to be pitted against the other in making sales and breaking prices. It is an open secret that brokers sell Wire in carload lots at lower figures than the makers of the Wire they sell would accept, which makes them directly antagonistic to the regular jobber, who, to protect his own interests, is not inclined to let the trade pass so long as there is a small margin of profit left. Quotations are made by jobbers at 3¼¢ on Painted



and 4 1/2¢ on Galvanized in small lots from store. On these prices they announce 10¢ off in carload lots, but it is said that sales have been made at figures which would not net over 3 1/2¢ on Painted Wire. Some of the manufacturers have large stocks, and the want of confidence in each other inclines them toward reducing the stock of Wire on hand at figures as near to present quotations as possible. This position of affairs is the cause of considerable annoyance to the present Barb Wire Association, and a meeting has been called by their secretary for all makers, jobbers and brokers of Barb Wire, and also Wire Drawers, west of the Alleghany Mountains, to be held at the association rooms, in this city, on the 16th and 17th insts. The workings of the association thus far have not been an entire success. A distrustful feeling seems to exist among members of the association, which must necessarily be removed before confidence will obtain and a uniform market price be secured.

**Nails.**—The past week has not shown any more irregularity in the market than has been noted for some weeks. It would appear that the nearer manufacturers approach a settlement of the long-continued strike with the feeders the greater becomes the irregularity and weakness in prices. Jobbers in this locality have all been pretty well loaded up with Nails at prices which give them considerable leeway compared with the present selling price, and when "Greek meets Greek" there is no hesitation in shading the price of his competitor. On a single order recently we learn that through this *modus operandi* the price on a lot of Steel Nails was lowered about 15¢ per keg. In this procedure jobbers are encouraged by the offers they receive from manufacturers, whose price has fallen from 10¢ to 15¢ per keg on both Iron and Steel Nails in the last two weeks. The distressed condition of the market is attributed by the jobbers to the general belief that the strike between manufacturers and feeders is virtually at an end, though no definite settlement has yet been announced. They further claim that, should manufacturers in the West start up, Eastern Nails would be less valuable. The Nail mill at Bay View, Wis., had some unexpected trouble between the nailers and feeders, the latter wishing to be paid on the 21¢ scale, while the nailers were working on an 18¢ basis. We could not learn how the matter was adjusted, but understand that between 70 and 80 machines are in operation.

**American Pig Iron.**—The market, compared with the previous week, shows very little change, the condition, however, if anything, being more favorable to the consumer. Irons of all classes and grades appear to be more plentiful, and consumers are not purchasing beyond immediate wants. We hear of but few sales of 100 tons and over, the majority ranging from 50 tons down to carload lots. Buyers having cast aside their anxiety to obtain Iron has caused sellers to work harder and offer slight inducements. Through this means the aggregate of tons sold was a slight improvement over the latter part of February, though prices are a shade lower. On Lake Superior Charcoal, Nos. 1 and 2, we continue our quotation of \$22 for standard brands, four months, in carload lots. On good round orders these prices could be shaded 50¢ per ton. The cry "scarcity" is no longer heard among sellers of Coke Iron, and quotations made at \$19 to \$19.50 for No. 1, and \$18 for No. 2, could very likely be shaded a fraction on large blocks. On Cinder Mixed \$18 to \$19 is quoted, and in this class of Iron are embraced a number of reputable brands which have occasionally sold for a clean Coke Iron. Ohio Scotch Irons are less plentiful. The Briar Hill Co. continue the quotation on their brands of \$21, as do also the Hubbard. On Ohio Standard Black-band prices range from \$19.50 to \$20. Both these Irons are in fair request. The withdrawal of Southern Iron from the market has given them a larger field of consumption, and they have taken advantage of it to sustain prices. Southern Irons are spoken of only from force of habit. We do not understand that enough sales have been made to give a market value to the Iron. Railroads recently made a reduction of 25¢ in freight rates from Birmingham to Chicago—the rate now being \$4.50—but it does not assist them very much in selling their Iron. On No. 1 Southern Foundry we renew quotations of \$19; on No. 2, \$18.50; No. 2 1/2, \$17.50 to \$18. Later we hear of considerable increase in the demand for Bessemer Irons. It is reported that about 10,000 tons have been sold during the week, and another order of 5000 tons additional pending, principally for Pittsburgh shipment. Charles Himrod & Co. have been appointed sales agents for the Iron River Furnace Co., Lake Superior Charcoal Iron.

**Merchant Steel.**—In all classes of Steel the market is irregular, and business is done at prices that are profitless. The new classification does not seem to remedy the former evil. Sales agents have not as a rule adopted it, so far as adhering to the prices go. Tool Steels are reported off, and quotations made as low as 7¢, ranging to 14¢, according to quality and quantity. Open Hearth and Bessemer Spring Steel, 2 1/2¢ @ 2 1/2¢; Flat Machinery, 2 1/2¢; Crucible Machinery, 4 1/2¢ @ 5¢; Crucible Cast Steel, 4 1/2¢; Patented Plow Steel, 5 1/2¢. There is a better demand reported for Plow

Steels in a general way, with several very nice orders recently closed. Stocks are said to be scarce for Soft Centers, and consumers of this grade of Steels are very actively employed.

**Bar Iron.**—On the best Refined brands of Bar Iron the 1.85¢ @ 1.90¢ rates, according to quantity, seem to be pretty well sustained out of store. In carload lots 1.80¢ rates are adhered to. Since the advance was made by jobbers in this city several weeks ago there is less uniformity in price, and some of the jobbers of mixed grades of Iron do not hesitate to sell at a fraction below these figures. This is largely the result of the action of manufacturers. Many of them have been talking higher prices for a long time, but when it comes to securing orders we find that they are willing to deliver Merchant Bars to jobbers in this city at as low figures as any time within the last three months. Purchasers, however, are looking carefully to the material they buy, and will give New Puddled Iron preference at 1/10¢ advance. Railroads are buying pretty liberally, and in a general way the demand is all that could be expected, compared with other branches of trade.

**Steel Rails.**—In the way of sales nothing is doing in the Steel-Rail market. Makers in this city are well contented with the situation. The Joliet mills have all that they can do and are not desirous of taking additional orders now. The N. C. R. M. Co. started their south branch works on Saturday last and have three blast furnaces in operation. They start the north branch mill to-day on Steel Nail Plate, which will be used at the Bay View Nail Mill. Prices on Rails are nominally the same as heretofore.

**Old Rails.**—No transactions of importance are reported. Nominal quotations are \$20, Chicago, at which figure, it is said, several hundred tons changed hands last week. Some holders are still asking \$21, but it is believed that the market price is rather under \$20 than above it. Steel Rails are quoted at \$18 to \$19 for Long Sections. The material in both classes offering is greater than the demand.

**Structural Iron.**—Foundrymen making Structural Iron report that they have plenty of work on hand to keep them running for several months, but nothing new of any importance is in sight. There is quite a good demand for Beams and Channels in small lots from store. The North Chicago mill which will start to day will commence the rolling of some sizes of Beams which they will likely be ready to market later in the season. We quote as follows: Beams and Channels, \$3.50, from store; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Prieze Plates, \$2.70.

**Black Sheets.**—Inquiry by jobbers on stocks for fall delivery has brought into the market manufacturers who are exceedingly anxious to take orders. Prices named are weak and irregular, and scarcely show what the bottom figure may be. There is very little trade doing from store in small lots at the following prices: Nos. 10 to 14, 2.60¢; No. 16, 2.80¢; Nos. 18 and 20, 2.90¢; Nos. 22 and 24, 3¢; Nos. 25 and 26, 3.10¢; No. 27, 3.20¢.

**Galvanized Iron.**—While prices are weak there is nevertheless a fair trade reported by those who are willing to meet competitors' figures. No heavy orders have been placed and most of the sales have been made on light weights. We quote 62 1/2¢ off on Juniata and 62 1/2¢ and 10¢ off on Charcoal from store. Jobbers and makers of the very best grades say that they will not meet the prices made on the poorer grades, and hold their prices from mill at about the same as jobbers ask out of store.

**Old Wheels.**—Quite a good trade has been doing recently. The decline in price has made holders more anxious to dispose of their stock, and we hear of several sales having been made during the last week at \$16.50. Others continue to ask \$17, to which price they would likely adhere for small quantities.

**Scrap Iron.**—Dealers are asking \$19.50 for No. 1 Wrought, from yard, and report a better demand. No. 1 Mill is quoted at \$14; No. 2 at \$9. Stocks are only in ordinary supply, and dealers are making special efforts to induce sales. We make the following quotations as dealers' purchasing prices: No. 1 Wrought, \$14; Machinery, \$12.50; Stove Plate, \$3; Steel Tires and Wagon Springs, \$13; Old Plows and Plow Steel, \$9.50; Wrought-Iron Turnings, \$10; Cast-Iron Borings, \$7.50; Malleable Scrap, \$7.

**Pig Lead.**—The high price at which Lead was selling last week brought out lots that were not known to exist. Speculators have been manipulating the market so cautiously that it is not unlikely there are more stocks stored away. The market opened last week at 4.80¢, then under pressure to sell dropped to 4.75¢, at which a few lots were sold. About the middle of the week prices hardened, and 4.85¢ was asked by one refiner, and 4.80¢ by others. Toward the close prices again declined, and we hear of Lead having been offered at 4.75¢, March delivery.

## Chattanooga.

Office of The Iron Age, Carter and Ninth Sts., CHATTANOOGA, March 8, 1886.

A review of the condition of general business shows but little change beyond what would be expected at the opening of spring business. The weather has continued cold

and very unfavorable up to within the last day or two, which has thrown the planting business very much behind, very little as yet having been done in this line. By a great many this is looked upon as being more favorable to the ultimate interests of the country, as it will cause a much less acreage of cotton and more of the grains and vegetables to be grown. The planting of cotton for the last few years has certainly not been a success from a financial point of view, whereas those who have turned their attention to the raising of grains and stock are comparatively much better off. Considerable mention has been made of the building boom that is prevailing in the South, but as the situation stands to-day the half has not been told of what is going on in this district. The same activity prevails in real estate, which is continually changing hands at advanced figures. This condition of affairs is by no means confined to this particular locality. Wherever manufacturing enterprises are located there is at once an activity both in real estate and building, and property in that vicinity at once advances from 50 to 100%. Considerable interest has been manifested lately in the production of Car-Wheel Irons, and a number of communications have been received from Northern Iron men expressing a desire to lease some of the charcoal stacks that are now idle, which can no doubt be done on most favorable terms.

**Pig Iron.**—There is nothing new to state in the condition of the market further than has been expressed in past reports. The furnaces have no trouble at all in disposing of their output at full market rates; in fact, there is hardly a stack in the South that has not sold ahead sufficient to keep it perfectly easy for some time to come. Car-Wheel Iron contracts are hard to make, and if a change should take place it would be an advance on present prices. The railroad lines have taken rather an arbitrary position on the question of freights, and advanced them to some points to such a figure as to cause quite a falling off in shipments. While such is the case, the result will not be unfavorable to the South, for quite a number of manufacturing interests located North that are large consumers of Pig are now looking in this direction, with a view of bringing their machinery to a point where little or no freight would be paid on the raw material.

**Hardware.**—In consequence of the extensive building now under way this article is quite active. The mills on Sand, Doors and Blinds are running full, and are enlarging their facilities as fast as they can conveniently.

**Railroad Material.**—All the mills that are specially in this line are running full and are having all they can do. There is a large demand for Light Rails, which is being partly met by our local mills and partly from the Pennsylvania mills.

## Birmingham.

BIRMINGHAM, Ala., March 8, 1886.

To satisfy any inquirer as to the state and tendency of business about here just now one would have to know what line he was interested in, for all lines are not equally active and prosperous, by any means. Heavy goods, such as have to be bought at all times, seem to be selling best; business has been good in these for the last month, and seems on the mend still, whereas in distinctly spring stock sales are not very satisfactory. Although their actual condition, as a rule, seems as good as it was this time last year, merchants do not seem to be buying with quite as much confidence. The Iron trade generally is still busy and cheerful, with a fair volume of business booked or within reach and at living prices.

**Pig Iron.**—Has a little better prospect, because of a slight reduction from the new freight rates that have caused so much complaint. This is not as reassuring as it might be, though, because it does not cover the whole ground. The rates have been changed only to Ohio River points, and Chicago and markets beyond are still practically inaccessible to Alabama Pig Iron. Twenty cents comes off the rates to the Ohio River, or rather will come off, for the reduction does not take effect until some time next month. Now that contracts made before the advance of rates are about satisfied, its effect is becoming more sensible. Business is rather quiet to what it was a while back, except with the East, and stocks are increasing a little. There is no visible weakness in prices, however, and no evidence that lower prices are expected.

**Finished Iron.**—The demand for rolling-mill product seems to have weakened a little in the aggregate. Merchant Irons are probably to be blamed for this more than any others. It would appear that the trade had anticipated its spring needs somewhat in its purchases, and thinks it should be rather more cautious now than it was a while back.

**Cast Pipe.**—The Birmingham Iron Works' Pipe is still sold ahead for about two months. The business offered them lately indicates that prices have not moved since they put themselves out of the market some six or eight weeks ago.

**Miscellaneous.**—Some of the foundries and shops have had to turn off work again. The preparations for changing the gauge of the railroads constitute a considerable factor in this line now, and others besides railroad shops are beginning to get some of the work, for a good many Coal and Iron and Lumber

roads which have no shops are going to make the change. One concern here has already booked half a dozen Engines and 150 Cars to be reduced to the 4-foot 9-inch gauge. Circumstances have conspired to make Tractor-Wheels a live commodity, and a new Wheel, just now offered, is one of the chief beneficiaries. One of its orders comes from the Tennessee Coal, Iron and Railroad Co.

**Nails.**—Still sell readily enough for \$2.50 at Brierfield. The Helena Mills, which had to stop about a month ago because of interruption to their Coal supply, will probably start again this week.

**Coal and Coke.**—Except for certain Steam Coals from small collieries and for Domestic Coals, which are beginning to feel the approach of warm weather, it may still be said that fuels are in excellent demand. One still hears of preparations for a big Coke trade. The management of the Watts Coal and Iron Co. now announce that they will build Coke ovens this summer.

## Cincinnati.

MARCH 8, 1886.

**Pig Iron.**—The market remains unchanged from last report. While many inquiries are being made for future supply, actual sales are mostly confined to the wants of foundries for immediate use and at quotations below. Reliable statistics show that through Cincinnati dealers the bulk of the Pig Iron made in the West and South is distributed to all parts of the United States and Territories and to the Provinces of Canada. It is reported that the late advance in freights by railroads to the East is seriously obstructing shipments of Western and Southern makes from furnaces—in fact, to some points in New England, New York and Canada these Irons are being shut out, to the great inconvenience of consumers and to the great damage of furnacemen. It is thought that the arbitrary rates of freight now enacted by the combined action of the railroads discriminates against Southern and Western Iron and largely in favor of the foreign makes. The demand upon the part of the railroads for present rates is doubtless unjust, as it is known that freight of lower class is being handled at a low price to many prominent points, and that both shippers and consumers are entitled to speedy remedy. The following quotations are predicated on actual offers and sales in the past week:

Charcoal Foundry.			
Southern No. 1, 4 mos.	18.00	@	19.50
Southern No. 2, 4 mos.	17.50	@	18.00
Hanging Rock, Best, No. 1, 4 mos.	21.00	@	21.50
Hanging Rock, Good, No. 1, 4 mos.	20.00	@	20.50
Hanging Rock, Good, No. 2, 4 mos.	19.00	@	20.00
Coke Foundry.			
Ohio and West Pennsylvania, No. 1, 4 mos.	18.00	@	19.00
Ohio and West Pennsylvania, No. 2, 4 mos.	17.50	@	18.25
West Pennsylvania, Bessemer No. 1, 4 mos.	30.25	@	.....
West Pennsylvania, Bessemer No. 2, 4 mos.	19.50	@	.....
Southern No. 1, 4 mos.	18.00	@	19.00
Southern No. 2, 4 mos.	17.25	@	17.75
Silver-Gray Softeners.			
Ohio, No. 1, 4 mos.	18.00	@	19.00
Ohio, No. 2, 4 mos.	17.00	@	18.00
Ohio, No. 3, 4 mos.	16.00	@	16.50
Other makes and grades, 4 mos.	15.00	@	16.00
Car-Wheel.			
Hanging Rock Cold-Blast, 4 mos.	25.00	@	26.50
Virginia Cold-Blast, 4 mos.	27.00	@	.....
Georgia Cold-Blast, 4 mos.	23.00	@	25.00
Southern Warm-Blast, 4 mos.	18.00	@	20.00
Southern Standard Warm-Blast, 4 mos.	25.00	@	.....
Hanging Rock Warm-Blast, 4 mos.	19.00	@	20.50
Forge.			
Range of makes and grades, 4 mos.	15.50	@	17.00
Scrap.			
Rails, no sales reported.			
Wheels, 100 lb.	17.00	@	18.00
Wrought, 100 lb.	50	@	50
Cast, 100 lb.	30	@	30

Quotations on Pig Iron are f.o.b. here, or less freight to Cincinnati when orders are shipped from furnaces; 50¢ per ton discount from time prices for cash.

## Louisville.

W. B. BELKNAP & Co., Louisville, write as follows, under date of March 8, 1886: Notwithstanding the adverse weather in February, we have not this year had to contend with floods, as in certain previous years, which must be an offset to more or less disappointment in trade. Although disappointing, the month compared favorably with last year, we take it, when the sales were figured up. Trade is late, and, when late, never makes up quite for lost time. Owing to the low price of farm produce in the South, the agricultural communities are said to be not so well off as they might be, but we cannot believe that this is general. The demand for improved implements has been so good thus far that we cannot believe the farmers are poor. Among advances in the market we note one in Wrought Butts. This, coupled with the appearance of the Burden Horseshoe circular marking the price up, instead of down, the first time in several years, the firmness of Steel Tire, Plow Steel and Plain Wire, all go to lend considerable confidence. The railroads, too, show the effect of business in their lack of rolling stock. The L. & N. R. R. here have been short certain days recently from 150 to 200 cars. An encouraging feature of the situation is the fact that the railroad rates are well maintained, except in the case of California business, where both freight and passenger rates are much demoralized. The rate on freight from this point, usually about \$1.50, has been cut to 50¢, and our manufacturers are making large shipments of whisky, Iron Mantels, plug tobacco and leather. There is certainly nothing in the way of a free exchange of commodities between the East and the Pacific Coast at present. Some discouraging features, on the contrary, are the labor difficulties at present existing and threatened, the extreme dullness of business in Europe and the reduced earning power of

capital. The fact that not everybody is making money is manifested in the disastrous fires that have thus far marked the year, and, while failures recorded as such are not excessively numerous, there is a phase of defrauding one's creditors which is becoming painfully common in this part of the country. We are not advised whether it spreads over other sections or not. We refer to the practice of "selling out." When the agency circular comes to us daily, with its long record of "sold out," it simply means that the creditors of such parties are badly sold, and will, in all likelihood, wait a good while for their money. Some steps must necessarily be taken if this phase of dishonesty continues to increase as it has the past 12 months.

**Bar Iron.**—Is holding its own without any great demand or prospect of change one way or the other. Very few of the mills seem soliciting business, and none of them eager to take it, except at what nets a material advance over last summer's figures. Some of the lots of Pig Iron which have been held here for a couple of years have been moved by present prices and been distributed throughout the country.

**Hoop, Band and Sheet.**—There is nothing special to note. Manufacturers of the latter continue to predict higher prices for light gauges within the next 60 or 90 days, and buyers continue skeptical.

**Steel.**—The advance made by the manufacturers in low-grade Steel in January is just now beginning to be felt as the old contracts expire and new ones are to be made. Steel Tire, Round Machinery, &c., owing to the new classification, on top of the base advance, run anywhere from 1/2¢ to 3/4¢ over the lowest prices of 1885. Plow Slabs are anywhere from \$6 to \$10 per ton higher, and consequently Plow Shapes, both plain and finished, are commanding better prices.

**Nails.**—Are very firm. The demand is increasing slightly as the spring approaches, but from reasons stated in our report last week there can be no materially higher prices. The demand for Steel Nails is particularly good. Iron Nail mills being distributed over the country pretty generally, there is no special scarcity of these in any one quarter.

**Horse Shoes.**—The Burden circular, under date of March 1, is gratifying in that it makes an advance in Shoes. For years we have had nothing but declines. The impression among the trade was that Shoes would open at last year's prices, but that buyers who placed their orders now would get the benefit of an advance during the year. That any advance was made, however, is reassuring to the trade at large. Of course the other factories will follow suit, and the new prices established here will be from 15¢ to 25¢ higher than asked heretofore.

Among goods manufactured here sold largely with Hardware may be mentioned Plow Single-Trees and Collars. Makers report an unusually heavy demand this year.

GEORGE H. HULL & Co., of Louisville, report to us as follows, under date of March 8, 1886: The market continues very quiet in this section. There is some revival in the inquiry for Charcoal Car-Wheel Iron, and several considerable sales have been made during the past week at prices fully up to quotations. The inquiry for Coke Iron, however, is still limited, and the supply from furnaces also. Prices have not changed, and there are no indications of any change in the immediate future. We quote for cash in round lots as below:

PIG IRON.			
Southern Coke, No. 1 Foundry.	18.00	@	19.50
" " No. 2 "	17.00	@	17.50
" " No. 3 "	16.50	@	17.00
Hanging Rock Coke, No. 1 Foundry.	18.00	@	18.50
Hanging Rock Charcoal, No. 1 Foundry.	20.00	@	21.00
Southern Charcoal, No. 1 Foundry.	18.00	@	19.00
Silver Gray, different grades.	16.50	@	17.50
Southern Coke, No. 1 Mill, Neutral.	15.00	@	15.50
" " No. 2 "	15.00	@	15.50
" " No. 1 " Cold Short.	15.50	@	16.00
" " Charcoal, No. 1 Mill.	17.50	@	18.00
White and Mottled, different grades.	13.00	@	14.50
Southern Car-Wheel, standard brands.	25.00	@	26.00
Southern Car-Wheel, other brands.	21.00	@	22.00
Hanging Rock, Cold-Blast.	27.00	@	28.00
" " Warm-Blast.	21.00	@	22.00

**Old Material.**—The market for Scrap has been attended with no new features. Those who were asking prices largely above the views of the purchasers have moderated and are willing to sell at reasonable figures. This has resulted in some moderate sized sales. For Country Scrap prices are still firm, and most lots offered are rapidly sold. The stocks are light and not accumulating. We quote for cash as below:

Rails, 100 lb.	\$20.50	@	\$22.00
Wheels, 100 lb.	14.00	@	15.00
No. 1 Country Wrought, 100 lb.	50	@	50
No. 1 Country Wrought, 100 lb.	50	@	50
No. 2 Country Wrought, 100 lb.	40	@	40
No. 1 Cast, 100 lb.	40	@	40
Boilers, cut, 100 lb.	60	@	60
Boilers, uncut, 100 lb.	40	@	40
Fuses, Tanks and Sheets, 100 lb.	30	@	30
Burned Scrap and Sheets, 100 lb.	30	@	30
Axles, 100 lb.	90	@	90

## Detroit.

Charles Himrod & Co., dealers in Pig Iron, Detroit, Mich., report, under date of March 8, as follows: Perhaps a slight improvement has been felt in Pig Iron circles here during the past week. There have been a few more inquiries and there have also been some actual transactions, but of no great magnitude. It seems to be the general impression that the Pig-Iron man to-day is only waiting for some stimulus, however slight, to have him demand better prices for his products. The shipments of Iron on sales made the latter part of last year are progressing rapidly just now. New business, as we have said, there is very little of. For present quotations on four months' time we present the following:

Lake Superior Charcoal, all numbers.	\$21.00	@	\$22.00
Lake Superior Coke, All Ore.	30.50	@	31.00
Lake Superior Coke, Cinder Mixed.	19.00	@	20.00
Standard Ohio Blackband.	30.50	@	31.00
Southern No. 2.	18.00	@	19.00
Southern Silvery, Open.	17.50	@	18.50
Southern Silvery, Close.	17.00	@	18.00
Jackson County, Ohio Silvery.	19.50	@	20.00
No. 1 Southern Mill.	16.50	@	17.50
American Old Iron Rails.	22.00	@	24.00
Old Wheels.	17.00	@	19.00







Tobacco Cutter, No. 1	30¢ 10¢ 10
Tobacco Cutter, No. 2	40¢ 10¢ 10
Holmes Tobacco Shaver	40
827, Acme Tobacco Cutters	40
Hay and Straw Knives	30¢ 10
Electric Hay Cutters, No. 1	10¢ 10
828, Coffee Mills, Change list I H Box, No. 1	40¢ 10¢ 2
829, Coffee Mills	45¢ 10¢ 2
830, Enterprise Coffee Mills	20¢ 10
831, Enterprise Sled Irons	20
832, Self-Heating Irons	20
Self-Heating Tobacco Irons	20
833, Self-Heating Tobacco Irons	20
Note: No. 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000	

Tailors' Gleeing, 5 cents per pound . . . . .	net
B. & D. Polishing Irons . . . . .	10
Keystone Polishing Irons . . . . .	10
Black's Polishing Irons . . . . .	30
Troy Polishing Irons . . . . .	30
893, Toy Sad Irons and Stands . . . . .	55 1/2 10
Tuy Ducks . . . . .	30 1/2 10 1/2 10
Sad-Iron Stands . . . . .	60 1/2 10
Foot Warmers . . . . .	50 1/2 10
Griddles . . . . .	50 1/2 10
Plating Machines . . . . .	35
Pinking Irons . . . . .	40 1/2 10
Fluting Scissors . . . . .	40 1/2 10
894, Crown Fluting Machines . . . . .	85
Eagle Fluting Machine . . . . .	35
"Knox" Fluting Machine . . . . .	35
American Fluting Machines . . . . .	35

35,	Crown Hand Fluters.....	35
	Shepard Hand Fluters.....	40
	Shepard Hand Fluters, No. 110.....	40
	Shepard Hand Fluters, No. 35.....	40
	Geneva Hand Fluters.....	35
836,	Enamelled Kettles.....	56
	Boilers and Sauce Pans.....	56
	Brass Kettles.....	net
	7 to 16 inches, 22 cents per pound.	
	18 inches and over, 24 cents per pound.	
	Timing Glue Pots.....	30
	Family Glue Pots.....	30
	Coffee Roasters.....	30
837,	Sardine Shears.....	50X10
	Can Openers, No. 5.....	75X10
	Can Openers, No. 6.....	75X10
	Can Openers, No. 4.....	70X5
	Can Openers, Star.....	20X10
	Can Openers, Sprague's.....	50X10X10
	Can Openers, "The Best".....	50X10
	Monroe's Novelty Glass Cutters.....	50X10
838,	Ice Axe and Pick.....	50X10
	Ice Chisels.....	55X10X5
	Ice Axi's, Nos. 1 and 10.....	50X10
	Ice Axes, Dunlap's.....	30
	Ice Tonges, Family.....	30
	Ice Tonges, Wrought.....	70
	Nut Cracks.....	60X10
	Table Nut Cracks, Nos. 1 and 2, cancel.....	
	Table Nut Cracks, Nos. 10 and 12.....	30X10
	Butter and Cheese Trays.....	

830, Dean Lemon Squeezers . . . . .	50x10
Porcelain-Lined Lemon Squeezers, No. 20 . . . . .	40x10
Crater Lids . . . . .	50
Standard Egg Beaters . . . . .	50
National Egg Beaters . . . . .	30x50
Thermometers . . . . .	60
840-841, Cork Screws . . . . .	40
842, Plated Spoons and Forks . . . . .	50x10x5
844, Plated Steel Spoons and Forks . . . . .	50x10x5
German Silver Spoons and Forks . . . . .	40x6
845, Britannia Spoons . . . . .	60x10
846, Excelsior Spoons and Forks . . . . .	25x10
Iron Spoons, Change List, No. 305 to \$4.15 . . . . .	75
Plating Basting Co. . . . .	75
Plated Knives, Medium, per doz., \$2.75 . . . . .	75
Dessert, per doz., \$2.50 . . . . .	75
Tea Bells, Nos. 070 to 026 . . . . .	10x1
Tea Bells, Nos. 1 to 4 . . . . .	50
847, Cal Bells . . . . .	50
848, Polished Hand Bells . . . . .	20x10

Auctioneers' Bells.....	10
Globe Hand Bells.....	10
Gong House Bells.....	25 & 10
Alarm Door Bells.....	40 & 10
House Bells.....	40 & 10
Sheep Bells.....	50 & 10
	10

830. Cow Bells	50
830. Heel Stuffers	50
Egg Beaters, Nos. 102, 106, 170 and 171	10x7 1/2
Free Breaks, No. 74	75
Zero Stove Lifters	75
Wood Handle Stove Lifters	10x10
Cool Stove Lifters	75
851, Stove Shovels, old No. 55 is now No. 54, a little smaller than old No. 55, list, \$1.50	10x10 1/2
853-855, Ames' Shovels, Spades and Scoops	50
855, R. & E. Mfg. Co. Shovels, Spades and Scoops	25
856, Spading and Tanners' Forks	60
857, Spading and Tanners' Forks	60
Potato and Manure Hooks	60
Garden Rakes, Cast Steel	10x10
Garden Rakes, Malleable	10x10 1/2
Wooling Hoes and Rake	10x10 1/2
858, Garden Hoes	10x10
Street Hoes	10x10
Handled Planters' Hoes	50x10
Planters' Hoes	50x10
Scuffle Hoes	40
Edging Knives	40
Garden Trowels	45x10
Grass Hooks	50x10
859, Floral Sets	50
Corn Hooks	50
Bush Hooks	50x10
860, Snaths	50x10
861, Scythe Stones, change list	40
862, Torrey's Razor Stropps	20
863, Torrey's Razor Stropps	33 1/2
864, Ad. No. 02, Combination Strop, similar to 7x, list, \$3.75	30x10
Emerson's Razor Strop, 90C, 97D, 10B1	60
Emerson's Razor Strop, 96C	65
Emerson's Imitation Razor Stropps	30x10 1/2
Emerson's Razor Stropps, C, make void D & E and The Tourist's and Toilet	60
864, Torrey's Razors	20
Razor Hones	10x5 1/2
Measuring Instruments	33 1/2
Allen's Rabbit Metal, per pound, 10% cents net	10
Excelsior Metal, per pound, 5 cents net	10
865, Transom Lifters, Bronzed and Nickel Plated	50
* Transom Lifters, Ornamental and Plain Bronze	25
* Transom Lifters, Ornamental Brass	35
* Transom Lifters, Nickel Plated on Brass	30
* Transom Lifters, Bronzed Plated	30
* Transom Lifters, Plain Brass	30
* Transom Lifters, Bronzed Iron Rod, with Dec. Bronzed Trimmings	50
866-867, Revolvers, R. H. No. 1	net, \$6.75
Revolvers, R. H. No. 1, Rubber	net, 60
Revolvers, R. H. No. 1, Long	net, 60
Revolvers, R. H. No. 1, Engraved	net, 60
Revolvers, R. H. No. 1, Long Rubber	net, 55
Revolvers, R. H. No. 2	net, 1.21
Revolvers, R. H. No. 2, Engraved	net, 1.21
Revolvers, R. H. No. 2, Rubber	net, 1.31
Revolvers, R. H. No. 3	net, 1.39
Revolvers, R. H. No. 6	net, 2.22
Revolvers, Union, No. 1 1/2	net, 1.10
Revolvers, Union, No. 1 1/2, Rubber	net, 1.40
Revolvers, Union, No. 3 1/2	net, 2.10
Revolvers, Union, No. 3 1/2, Rubber	net, 2.25
Revolvers, Victoria	net, 1.90
868, Rev. Fire Cartridges	60
Ad. Rim Fire Blank Cartridges	60
Box	32
	\$1.50 3 1/2
Central Fire Cartridges	40
Caps, G. D.	net, 2 c
Caps, F. C.	25
Caps, U. M. C.	25
Caps, D. W. P.	25
Caps, Colt's Pistol	10
Caps, Musket	net, 50c
Spring Cottons, change list	50
869, Tackle Blocks, &c., new list	50
870, Awning Blocks	50x10
871, Paint Brushes	60
Varnish Brushes	60
Sash Tools	50x11
Kalsomine Brushes	60
Wall Brushes	60
Paint Dusters	10x11 1/2
871, Whitewash Brushes	60
Whitewash Heads	60
872, Roof Brushes	60
Dusting Brushes	40x10
Broom Brushes	10
Horse Brushes	50x13
Mane Brushes	60
Hoof Brushes	70
873, Scrub Brushes, Change list, No. 230, \$1.50	50x10
Stove Brushes	50x11
Shoe Brushes	50
Flat Varnish Brushes	50
Marking Brushes	50
Feather Dusters	50



**L. COES'**  
GENUINE IMPROVED  
**Knife Handle**  
PATENT  
**Screw Wrenches**  
MANUFACTURED BY  
**L. COES & CO.,**  
Worcester, Mass.  
ESTABLISHED IN 1839.




Patented July 6, 1880. Patented July 8, 1884.  
Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.  
Straight Bar, Extra LONG NUT FOR SCREW IN JAW.

The Best Made and Strongest Wrench in the Market.  
Send for Illustrated Price List and Circular.

**J. C. McCARTY & CO.,**  
NEW YORK,  
Sole Agents.

## ILLINOIS IRON & BOLT CO.,

Nos. 20 to 26 Main Street,

CARPENTERSVILLE. KANE CO., ILL.

MANUFACTURERS OF

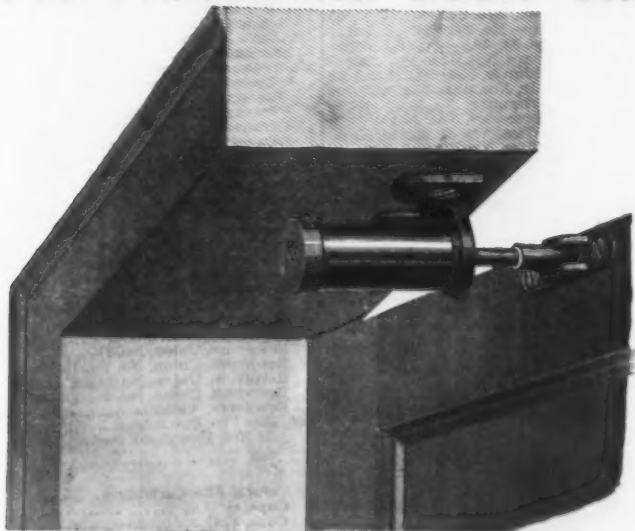


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COPYING PRESSES AND STANDS, &C

**WATTS • MANUFACTURING • CO.,**  
480 PEARL STREET, NEW YORK  
SOLE MANUFACTURERS OF THE

**WATTS PNEUMATIC DOOR CHECK.**

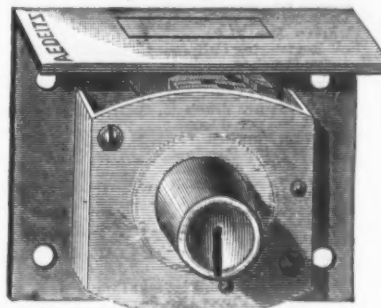


The Latest Improved, Most Simple and Only Reliable Door Check  
Now on the Market.

It can be applied to either side of the Door or on the casing overhead. In fact, the only universal Air Door Check made that can be sold over the counter, not requiring an expert to put it on. Can be applied by anybody, and are sold at a less price than other Checks. Catalogues and Price Lists furnished on application.

**E. MERRITT & CO.**  
ESTABLISHED 1859 — BROCKTON, MASS.  
The Only Manufacturers of a Complete Line of  
**TACK AND NAIL MACHINERY.**  
SEND FOR CIRCULAR — UPRIGHT DRILLS.

## A. E. DEITZ.

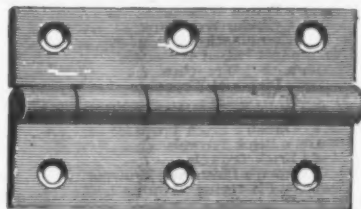


No. 51 Lock.

**J. C. McCARTY & CO., Agents,**

97 Chambers and 81 Reade Sts.,

NEW YORK.



**W. & J. TIEBOUT,**

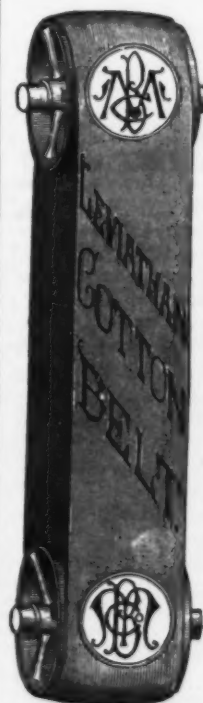
MANUFACTURERS OF

BRASS, GALVANIZED & SHIP CHANDLERY

**HARDWARE.**

Nos. 16 & 18 Chambers Street,

NEW YORK.



ALWAYS GIVES THE  
UTMOST SATISFACTION.

Main Belting Co.,

Manufacturers of

THE LEVIATHAN

**COTTON**

**BELTING.**

Unsurpassed for

Strength, Durability and

Cheapness.

Made to any Length,

Width and Strength.

Main Driving Belts.

Guaranteed to Run

Straight, Even Through-

out.

No Cross Joints, Un-

affected by Damp.

Clings well to the Pulley.

Has no equal. In fact,

is THE BELT.

**MAIN BELTING**

**COMPANY,**

S. W. cor. Ninth and Reed

Sts., Philadelphia.

Also

248 East Randolph St.,

CHICAGO.



**EXPANDING  
TAPS**

From 3-4 in. to 10  
in. Wrought-Iron  
Pipe Size.

SEND FOR PRICES.

**WORSWICK MFG. CO.,**  
CLEVELAND, O.,

Manufacturers of

Malleable and Cast Iron Fittings and  
Brass Goods.

Jobbers of

Plumbers', Gas and Steam Fitters'  
Tools and Supplies.

Agents for

IRON PIPE AND BOILER TUBES.

SEND FOR CATALOGUE.

**Band Saws, Circular Saws, Planers**



AND

Other Machines for

Pattern Shops.

**BUFFERS, GRINDERS**

AND OTHER

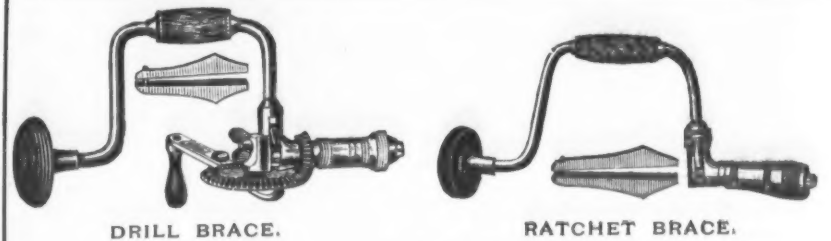
Metal Working Machines.

**LATHES**

For Wood and Metal.

CATALOGUES FREE.

P. PRYBIL, 467 W. 40th St., NEW YORK.



DRILL BRACE.

RATCHET BRACE.

During the year 1885 many new styles of Bit Braces were put on the market, and many old styles were much reduced in quality and price. In face of it all we made our Braces a little better than ever before, and kept our prices steady.

We felt certain that good workmen would buy good tools, and that they would find them in some place. The result bore out our anticipations. Though business generally was not remarkably good, we found at the end of the year that our Brace sales had been larger than ever before.

For the year to come we will make still better goods, sell them at a reasonable price, and trust that our friends, the Dealers, will put them within the reach of all who want them at such prices.

## MILLERS FALLS CO.,

74 CHAMBERS STREET,

NEW YORK.

**CHAMPLAIN**  
Forged Horse Nails.  
MANUFACTURED BY THE  
**NATIONAL HORSE NAIL CO.,**  
Vergennes, Vermont.  
HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
NORWAY IRON AND WARRANTED.  
WAREHOUSE  
97 CHAMBERS AND 81 READE STREETS NEW YORK.  
**J. C. McCARTY & CO. Sole Agents.**

H. B. SEIDEL  
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W. HASTINGS,  
Vice-Pres. and Gen'l Mgr.

E. T. CANBY,  
Sec. and Treas.

## THE SEIDEL & HASTINGS CO.

WILMINGTON, DELAWARE,

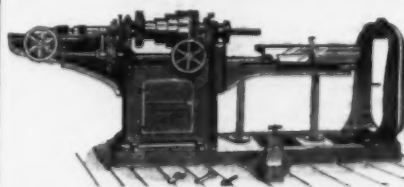
New York Office, No. 221 Pearl, Corner Platt Street,

MANUFACTURERS OF

**BEST CHARCOAL  
BOILER PLATES,  
AND PLATE IRON GENERALLY.**

ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we manufacture expressly for the Shells of Steam Boilers and stamp 50,000 pounds T. S. when desired. One hundred and sixteen tests of this iron, made during the last three years by the U. S. Inspectors of Steam Vessels, show an average tensile strength of 55,808 pounds to the sectional square inch, and an average reduction of area of the fractured section of 30% per centum. Our prices are as low as the production of a good article will admit of.



**BETTS MACHINE CO.,**

Wilmington, Del.,

MAKERS OF

IMPROVED

**MACHINE TOOLS.**

Double Acting Spring **BUTTS** SABIN'S LEVER DOOR SPRINGS,  
Coil, and Sabin's Volute Springs  
For various purposes made to order.

SABIN MACHINE CO., Montpelier, Vt.

**STRONGEST ACME WRENCH AND BEST**



ALL STEEL CASE-HARDENED JAWS. WARRANTED. MANUFACTURED BY  
OWSLEY BROS. & MARBLE, 784 to 794 Madison St., CHICAGO, U. S. A.  
Description and Price List Furnished upon Application.

## PURE TURKISH EMERY.

**WALPOLE EMERY MILLS,**

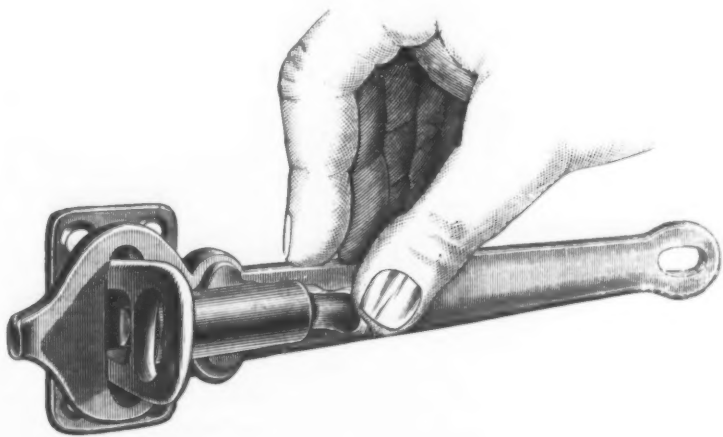
South Walpole, Mass.



## Hardware Novelties.

## Security Door Hasp.

The Sweet & Clark Mfg. Co., Troy, N. Y., are making this article, which is illustrated by the cut given herewith, from which its



The Security Door Hasp.

general features will be readily apprehended. It will be perceived that it is a combined spring bolt and hasp, having a double staple, with one opening for the bolt and another in which a padlock can be inserted when it is desired thus to secure it. Thus, it is pointed out by the manufacturers, it serves the double purpose of a latch and lock. It is 7 inches in length, made of malleable iron, tinned, and with each one a staple and screws are furnished.

## New Combination Vises.

The accompanying illustrations represent the Universal Combination Vises, which are manufactured by the Howard Iron Co., Buffalo, N. Y., Fig. 1 representing the Universal Combination Pipe and Metal Worker's Vise, and Fig. 2 the Universal Combination Wheelwright and Metal Worker's Vise. The construction and operation of these vises will be readily understood by our readers without a detailed description, emphasis being laid by the manufacturers on the simplicity of their construction and the fact that the jaws are readily reversed when desired,

the hand or getting in the way of the operator generally, as is frequently the case with common forms of snips. In using the straight-cut snips the right-hand side of the metal passes under the hand, as with the old style snips, while the opposite side passes from A to B, past the pivot C, over D and

the jaws being forged steel and hardened, and the shell which bears on the jaws as being also case-hardened, so as to prevent



Fig. 1.—Armstrong's Double-Grip Bit Brace.

wear. The manufacturers put it on the market with confidence that it meets a want of the trade.

## A New Corkscrew.

The accompanying illustration represents a corkscrew which is put on the market by

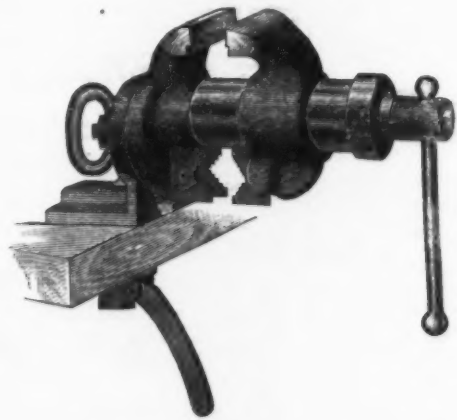
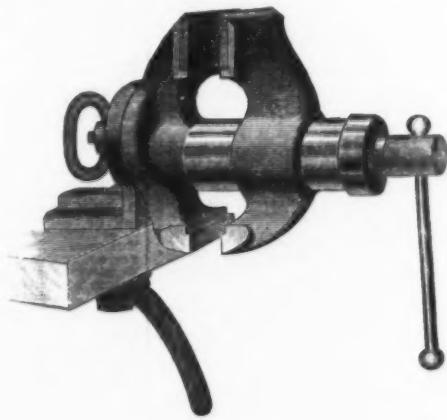


Fig. 1.—Universal Combination Pipe and Metal Worker's Vise.



Universal Combination Wheelwright and Metal Worker's Vise.

thus combining, as they express it, two different and separate vises in one. They are also described as made strong, and swiveling in any direction. The pipe and metal worker's vise, Fig. 1, is made in two sizes, one of which has 4 1/2 inch length of jaw, opens 4 1/2 inches, will take from 3/4 inch diameter to 3-inch pipe, and weighs 80 pounds. The other size has 3 inch jaw, opens 4 1/4 inches, will take from 3/4 to 2 inch diameter pipe, and weighs 52 pounds. The wheelwright and metal worker's vise, Fig. 2, has 4 1/2-inch length of jaw, opens 4 1/4 inches, and weighs 83 pounds.

## New Forms of Snips.

The accompanying engravings illustrate what are called "straight-cut" snips, now being introduced to the trade by the Razor

plated and the blades are arranged to overlap at the heel, so as to prevent catching on each other.

## Double-Grip Bit Brace.

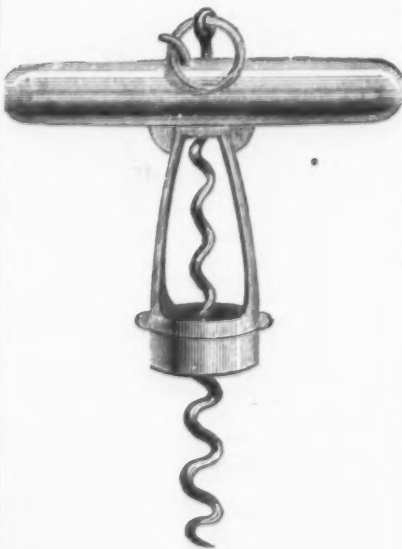
The Upson & Hart Co., of Unionville, Conn., are introducing Armstrong's Double-Grip Bit Brace, illustrations of which are afforded in Figs. 1 and 2. The general view of the tool is shown in the first illustration, while a detail of the means of holding the bit is shown in the second. The advantages claimed for this brace over others are that it exerts a double grip upon the bit, and thus overcomes the annoyance and delay occasioned by having a bit pull out or become loose in the chuck. In operating this brace the shell or sleeve is screwed down in the usual way, and then the cam lever shown in Fig. 2

W. B. Woodman & Co., Newark, N. J. The corkscrew is in the usual way turned into the cork until the swivel passes over the



Fig. 2.—Sectional View of Bit Brace.

cork and rests on the top of the bottle. Then the ring at the upper end of the corkscrew is to be lifted off the hook on the handle, when the handle, again turned as before, no longer drives the screw into the cork, but lifts the screw, and with it the



A New Corkscrew.

cork, and thus withdraws the cork from the bottle. The central wire, it will thus be seen, after it is inserted in the cork, remains without turning, and the cork, it is claimed, is drawn without difficulty. The manufact-

urers allude to the facility with which the operation is performed, and the resulting advantage.

## Stuart's Window-Screen Frames.

E. C. Stearns & Co., Syracuse, N. Y., are manufacturing Stuart's Window-Screen Frames, which were patented October 13, 1885. Fig. 1 represents the appearance of the frame and the manner in which it is fitted to the window. This operation is accomplished by simply sliding the sticks along on each other to the required size,

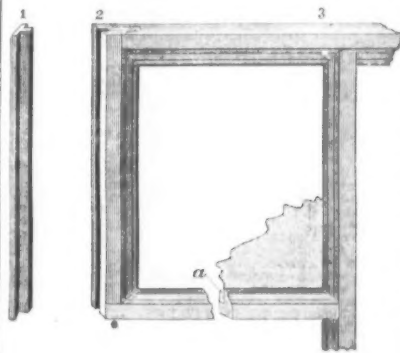


Fig. 1.—Stuart's Window-Screen Frame.

fastening by nail or screw, and sawing off the projecting ends. Fig. 2 gives a full-size sectional view of parts. It will be perceived that the corresponding numbers in the cuts indicate corresponding parts: 1 is the strip on which the frame slides; 2 is the side stick of frame; 3 is the cross stick of frame, and a shows head which is tacked on over the wire cloth. The manufacturers call attention to the fact that the frame thus made is much cheaper and in appearance superior to those generally made by mechanics, and that it is capable of any desired adjustment, and insures close fitting and

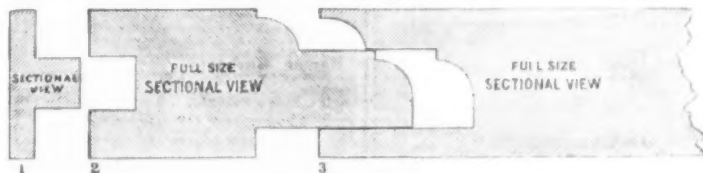


Fig. 2.—Sectional View of Frame.

accurate joints. These frames are made in four sizes: No. 2, 36 x 36 inches; No. 3, 42 x 42 inches; No. 6, 48 x 48 inches, and No. 7, 54 x 54 inches. They are packed six dozen in a case, and a strip for side of window, and head to attach screen cloth, furnished with each set.

## Moore's Anti-Friction Hay-Fork Pulley.

This article, which is named above and illustrated in the accompanying cuts, Figs. 1 and 2, is put on the market by the Moore



Fig. 1.—Anti-Friction Hay-Fork Pulley.

Mfg. Co., 165 Lake street, Chicago, Ill. It is made with malleable-iron frames, steel pins, 5-inch wheel and steel roller bushings.

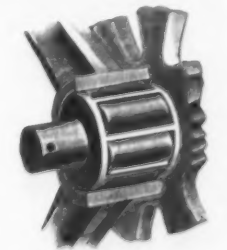


Fig. 2.—Roller Bushing.

Its general construction is represented in Fig. 1, and the roller bushing shown in Fig. 2.

**A Cheap Railroad.**—The Railroad Gazette cites a notable example of a cheap railroad found in the Dublin and Wrightsville Railroad, in Georgia. This is a standard-gauge road, recently completed from Wrightsville, Ga., to Bruton, a distance of 11 1/2 miles. It runs through a generally level country, and a little over the half of the right of way was given, though for about 5 miles it was necessary to buy the land. The grading was done by convict labor, for which \$1 per day per man was paid. Nearly one-third of the ties (2640 to

the mile) were cut on the right of way, and the rest were obtained close to it, their average cost being but 10 cents each. The whole cost of the road, graded and furnished with ties, ready for the rails, is reported by the treasurer at \$11,557, or \$1000 per mile. The company contracted with the Central Railroad Co. of Georgia to lay the track (with second-hand iron rails taken up from their main line) for \$1800 per mile, so that the road has cost so far \$2800 per mile. The stock subscriptions amounted to \$22,600, so that the company have about \$11,000 left to furnish equipment, and it is expected that the entire cost, including the equipment, will be under \$4000 per mile. An extension beyond the present terminus is to be built, which will cost a little more, as several bridges will be needed. This is a sort of neighborhood railroad, of which quite a number have been built in Georgia in the last few years. They furnish a cheap and convenient outlet for the products of the adjoining country, and have generally been built by the money of the people in the districts which they serve, their owners looking for a return in the saving of transportation of their crops rather than in the shape of dividends on their investment. These cheap roads are not by any means to be despised as feeders for the more important lines, and their construction has generally been encouraged by the older companies.

## New Sources of Manganese Ore in Russia.

Although the Russian charcoal-iron industry is so depressed that at the close of last year's fair at Nijni Novgorod upward of 70,000 tons of pig iron remained unsold, it would be too much to say that Russia is deriving little benefit from her mineral treasures. If we might venture to hazard a prediction, we should say that in a very few years' time the export of iron ore will be one of the most important branches of Russian trade in the Black Sea. What can be done in this line may be estimated by a reference to the progress of manganese ore in the Caucasus. It is not so long ago that

this business was wholly under the control of a few Greeks, who shipped it from the Caucasus to Constantinople, whence it found its way to one or two hands in this country. Now there is a direct export of the ore from Poti and Batoum to Austria, France, England and other countries, and it is already known in the market as the best that can be had. In 1879 the production of manganese ore in the Caucasus was only 1000 tons; last year, up to September alone, 30,000 tons had been shipped from Poti and Batoum, and it was believed that the total by the end of the season would not be much under 45,000 tons. Considering the perturbed condition of the Batoum district after Russia took it over, and the natural disinclination of Europe to resort to business in a region so recently the theater of war, such an advance is very remarkable, and demonstrates the good quality of the ore, which often surpasses by 16 per cent. the very best manganese obtainable elsewhere in Europe. Most of the ore comes from the districts of Jiatura and Rion, near the Quiril Station, on the Poti-Tiflis Railway, and, being situated on the west side of the Lesser Caucasus, has an easy run down to the seacoast. The chief drawback of the industry is the want of a good road 30 miles long, from the Quiril Railway Station to the mines—a matter that is now receiving the attention of the Caucasian authorities, and is likely to end by a branch line being laid down by the Transcaucasian Railway Co. In conjunction with this the improvement of navigation on the River Rion is also projected, so as to allow of consignments of ore being floated down to Poti. When these improvements are effected it is estimated by the Government surveyors that the export of manganese will spring at once to 100,000 tons a year and add to the prosperity of this part of the Caucasus. The deposits are of great magnitude, and the supply is said to be practically inexhaustible. But, even if this were not so, there are other deposits between Tiflis and Baku, on the east side of the Lesser Caucasus, near the Elesavetapol Station, which would make good any deficiency. These deposits are situated close to the copper mines of Messrs. Siemens Bros., in the Dashkezou defile, and, according to a recent official report, the extension thither of a short line of railway would enable 150,000 tons of manganese, hematite and other iron ores to be exported every year.

The case of Otto vs. Sterne (L. Sterne & Co.), in England, which it was understood was settled previous to the trial of the action of Otto vs. Steel, was called up on the 1st of February in the High Court of Justice—Chancery Division—before Mr. Justice Pearson. The attorney for the plaintiff stated that the case had been standing out of the paper pending a settlement, and the parties had now arranged terms. The defendant had agreed to submit to a perpetual injunction and to pay the costs, plaintiff on his part not pressing for any inquiry as to damages. The attorney for the defendant agreed to these terms, and the order was made accordingly.

In the destruction by fire of the pier sheds of the Monarch Steamship Line, another warning is had of the danger of using combustible materials in structures of this character. Within a few months three fires have originated in frame buildings on the wharves, mostly used for housing merchandise, entailing an aggregate loss of near \$1,000,000.

## New Forms of Snips, Made by the Razor Blade Shear Mfg. Co., Chillicothe, Ohio.

Blade Shears Mfg. Co., of Chillicothe, Ohio. The snips are designed for use in the sheet-metal trades and also by tool-makers. They are the invention of B. G. Lewis, secretary and treasurer of the company. The advantage claimed for this form of tool is that a straight cut is always made by it. When in use one edge of the metal is not continually coming in contact with the user's thumb or running on top of

is drawn up and closes the jaws firmly on the under side by the heavy pressure which it applies. It will thus be seen that it exerts a double grip upon the bit, and emphasis is laid by the manufacturers on the efficiency of its operation. It is described also as holding a round-shank drill so firmly as to save all annoyance from turning or loosening in the chuck. It is described as made from highly-polished steel and nickel-plated,



## Current Hardware Prices, March 10, 1886

## HARDWARE.

### Ammunition.

**Ammunition.**

Clocks & Goldmark's	.....	50¢
E. B. Trimmed Edge, 1-10's	.....	.50¢ dis 25¢
E. H. Ground Edge, Central Fire, 1-10's	.....	25 ¢ 8¢
Kentucky Bullet, 1-10's	.....	\$1.40
Musket Waterproof, 1-10's	.....	.50¢
G. D. ....	.....	.30¢
Union Metallic Cartridge Co.	.....	.50¢
F. C. Trimmed .....	.....	.75¢
Cent. Fire Ground .....	.....	70¢ 25 ¢ 8¢
Double Waterproof .....	.....	\$1.40
Waterproof, 1-10's .....	.....	\$1.40
Gunpowder Imported .....	.....	.45¢
Eley's E. R. ....	.....	.66¢
Eley's D Waterproof, Central Fire .....	.....	dis 15 ¢ 8¢
<b>Cartridges</b>	.....	.....
Rim Fire Cartridges .....	.....	dis 60 ¢ 2 ¢
Rim Fire Military .....	.....	dis 40 ¢ 2 ¢
Remington-Union, Pistol and Rifle .....	.....	dis 40 ¢ 2 ¢
Cent. Fire Cartridges, Military & Sporting, dis 30 ¢ 2 ¢	.....	dis 30 ¢ 2 ¢
Blank Cartridges, except .32 and .38 cal., at home	.....	dis 40 ¢ 2 ¢
Blank Cartridges, .32 cal. ....	.....	\$1.60, dis 2 ¢
Blank Cartridges, .38 cal. ....	.....	dis 25 ¢ 8¢
Bullseye, 1-10's .....	.....	dis 25 ¢ 8¢
B. B. Caps, Round Ball .....	.....	\$1.90, dis 2 ¢
B. B. Caps, Conical Ball, Swaged .....	.....	\$1.75, dis 2 ¢
<b>Primers</b>	.....	.....
Berdan Primers, all sizes, and B. L. Caps (for Sturtevant Shells) .....	.....	\$1.40, dis 2 ¢
Other Primers, all sizes .....	.....	dis 25 ¢
<b>Shells</b>	.....	.....
Paper Shot Shells, Int & 3d or S. G. qual, dis 25 ¢ 8¢	.....	dis 25 ¢ 8¢
Paper Shot Shells, Club, Rival, Climax, dis 40 ¢ 2 ¢	.....	dis 40 ¢ 2 ¢
Paper Shot Shells, Star Brand .....	.....	dis 50 ¢ 2 ¢
Brass Shot Shells, 1st quality .....	.....	dis 50 ¢ 2 ¢
Brass Shot Shells, Club, Rival & Climax .....	.....	dis 50 ¢ 2 ¢
<b>Wads</b>	.....	.....
U. M. C. & W. R. A.—B. E., 11 up .....	.....	\$2.00
U. M. C. & W. R. A.—B. E., 9 & 10 .....	.....	2.00
U. M. C. & W. R. A.—B. E., 7 & 8 .....	.....	dis 20 ¢ 2 ¢
U. M. C. & W. R. A.—P. E., 11 up .....	.....	4.00
U. M. C. & W. R. A.—P. E., 9 & 10 .....	.....	4.00
U. M. C. & W. R. A.—P. E., 7 & 8 .....	.....	400
Kley's B. E., 11 up .....	.....	\$1.75
Kley's B. E., 11 up .....	.....	\$2.80
<b>Anvils</b>	.....	.....
Armstrong's Mouse Hole .....	.....	\$ 10—dis 20 ¢
Armstrong's Mouse Hole, Extra .....	.....	94—dis 10¢
Tremont .....	.....	dis 25 ¢
J. & Riley Carr, Patent Solid .....	.....	dis 11—dis 10¢
<b>Augers</b>	.....	.....
Miller Falls Co., \$18.00 .....	.....	dis 20 ¢
Conely Auger and Vice .....	.....	dis 25 ¢
Allen Combing and Vice .....	.....	dis 40 ¢
Allen Combing and Vice .....	.....	dis 25 ¢
<b>Apple Parers</b>	.....	.....
Advance .....	.....	\$ 40—dis 75 ¢
Empire State .....	.....	each 40 ¢
Eureka .....	.....	each \$12.00
Improved Bay State .....	.....	\$ 40—dis 75 ¢
Gem .....	.....	\$ 40—dis 75 ¢
Jersey .....	.....	\$ 40—dis 75 ¢
Little Star .....	.....	\$ 40—dis 75 ¢
New Lightning .....	.....	\$ 40—dis 75 ¢
Rocking Table .....	.....	\$ 40—dis 75 ¢
Triumph, 1883 .....	.....	\$ 40—dis 75 ¢
Variable .....	.....	\$ 40—dis 75 ¢
Two-Knife .....	.....	\$ 40—dis 75 ¢
Whitmore .....	.....	\$ 40—dis 75 ¢
Whitmore's Perfection .....	.....	\$ 40—dis 75 ¢
Whitmore's Simplicity .....	.....	\$ 40—dis 75 ¢
"76" .....	.....	\$ 40—dis 75 ¢
<b>Saugers and Bits</b>	.....	.....
Douglas Mfg. Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
New Haven Cor. Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
Humphreysville Mfg. Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
French, Swift & Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
Cook's, Douglas Mfg. Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
Cook's, New Haven Copper Co. ....	.....	dis 60 ¢ 10 ¢ 5 ¢
Patent Solid Head .....	.....	dis 60 ¢ 10 ¢ 5 ¢
C. E. Jennings & Co., No. 1, extension 1ip .....	.....	dis 60 ¢ 10 ¢ 5 ¢
C. E. Jennings & Co., No. 2, extension 1ip .....	.....	dis 60 ¢ 10 ¢ 5 ¢
C. E. Jennings & Co., Auger Bits, in fancy boxes .....	.....	dis 60 ¢ 10 ¢ 5 ¢
Pat. 324, quarters, No. 5, \$5; No. 30, \$5 .....	.....	dis 60 ¢ 10 ¢ 5 ¢
Russell Jennings' Augers and Bits .....	.....	dis 60 ¢ 10 ¢ 5 ¢
Imitation Jennings Bits new list, dis 40 ¢ 10 ¢ 5 ¢	.....	dis 40 ¢ 10 ¢ 5 ¢
Car Bits, New Haven Copper Co. ....	.....	dis 50 ¢ 10 ¢ 5 ¢
H. Homedieu Car Bits .....	.....	dis 50 ¢ 10 ¢ 5 ¢
Russell Jennings' Bits new list, dis 40 ¢ 10 ¢ 5 ¢	.....	dis 40 ¢ 10 ¢ 5 ¢
Clark's small, 18's; large, 20's .....	.....	dis 35 ¢ 40 ¢ 5 ¢
Ives No. 1, per doz. ....	.....	dis 40 ¢
Steele's .....	.....	dis 25 ¢
Anson's, No. 1, \$20; No. 2, \$22 .....	.....	dis 25 ¢
Ives .....	.....	dis 25 ¢ 10 ¢
French, Swift & Co. ....	.....	dis 25 ¢ 10 ¢
Bonner's Adjustable w doz. \$48 .....	.....	dis 40 ¢ 10 ¢
Stearns' Adjustable w doz. \$48 .....	.....	dis 45 ¢ 50 ¢
Universal Expansive, each \$6.50 .....	.....	dis 20 ¢
Wood's .....	.....	dis 25 ¢ 25 ¢ 10 ¢
<b>Common</b>	.....	.....
Diamond .....	.....	\$ 40—dis \$1.00—dis \$1.25
Beck .....	.....	dis 25 ¢
Double Cut, Shepardson's .....	.....	dis 45 ¢
Double Cut, Ct. Valley Mfg. Co. ....	.....	dis 10 ¢
Double Cut, Kingsley & Co., gro. \$6.50 .....	.....	dis 10 ¢
Double Cut, Douglas .....	.....	dis 10 ¢
Double Cut, Ives .....	.....	dis 10 ¢ 10 ¢ 5 ¢
<b>Drill Bits</b>	.....	.....
Hot Bit Twist .....	.....	dis 30 ¢ 30 ¢ 5 ¢
Hot Bit Hot Stock Drill .....	.....	dis 25 ¢ 10 ¢
Ship Augers and .....	.....	dis 15 ¢ 20 ¢
Watrrous .....	.....	dis 15 ¢ 20 ¢
Shells .....	.....	dis 15 ¢ 20 ¢
Augers and Pattern Car Bits .....	.....	dis 15 ¢ 20 ¢
<b>Awl Bits</b>	.....	.....
Sewing, Brass Ferule .....	.....	\$ 50—dis 40 ¢ 10 ¢
Patent Sewing, Short .....	.....	\$1.00—dis 40 ¢ 10 ¢
Patent Sewing, Long .....	.....	\$1.20—dis 40 ¢ 10 ¢
Patent Peg, Plain Top .....	.....	\$1.00—dis 45 ¢ 10 ¢
Patent Peg, Plain Top .....	.....	\$1.20—dis 45 ¢ 10 ¢
<b>Awls, Brad Sets, &amp;c.</b>	.....	.....
Awls, Sewing, Common .....	.....	\$ gross \$1.70—dis 35 ¢
Awls, Sewing, Common .....	.....	\$ gross \$1.45—dis 40 ¢ 10 ¢ 5 ¢
Awls, Patent Peg .....	.....	\$ gross 65¢—dis 40 ¢ 10 ¢ 5 ¢
Awls, Shouldered Brad .....	.....	\$ gross 75¢—dis 45 ¢ 5 ¢
Awls, Shouldered Brad .....	.....	\$ gross 75¢—dis 45 ¢ 5 ¢
Awls, Handled Scratch .....	.....	\$ 75—dis 50 ¢ 10 ¢
Awls, socket scratch .....	.....	\$ 1.50—dis 50 ¢ 10 ¢
<b>Awls and Awl &amp; Tools</b>	.....	.....
Awls and Awl & Tools .....	.....	\$ dos. \$10.00—dis 50 ¢ 10 ¢
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Awls and Awl & Tools .....	.....	\$ dos. \$10.00—dis 50 ¢ 10 ¢

[illegible]

Garland.....  
Queen.....  
Queen, with band.....  
K. L. Cartridges—See Ammunition.

**Cartridges—See Ammunition.**

**Casters.**  
Bed.....  
Shate.....  
Deep Socket.....  
Yale Casters, regular.....  
Hartford Casters (Phoenix).....  
Payson's Anti Friction.....  
Universal Tractor Casters.....  
Stantary Truck Casters.....

**Cattle Leaders.**  
Humason, Beckley & Co.'s.....  
Sargent's.....  
Hartman's.....  
Peck, Stone & W. Co.....

**Chain.**  
Trace, 10-2, Eng. sizes.....  
Trace, 10-3, Eng. sizes.....  
Trace, 7-10-2, Eng. sizes.....  
Log, Fifth, Stretcher, and other rancy chains.....  
American Coll., 3-16.....  
In cask lots.....  
German Coll. list of June, 1881.....  
German Hatter Chain, list of June, 1884.....  
Covers, Traces, Hitching and Breast.....  
Menely's Breast, Halter and Hitching.....  
Pat. Steel Chain, Breast.....  
Oneida Hair Chain (old list).....  
Galvanized Pump Chain.....  
Jack Chain, Iron.....  
Jack Chain, Brass.....

**Chalk.**  
White.....  
Royal.....  
Blue.....  
White Crayons.....

**Chalk Lines.—See Lines.**

**Chisels.**  
Scott's Claw and Firmer.....  
Douglas & Witherby.....  
Socket Framing and Firmer, Buck Bros.....  
Socket Framing and Firmer, Merritt.....  
Socket Framing and Firmer, L. & J. White.....  
Tanged Firmer.....  
Tanged Firmer, Butcher's.....  
Tanged Firmer, Buck Bros.....

**Clamps.**  
Providence Tool Co.'s Wrought Iron.....  
Adjustable, Gray's.....  
Adjustable, Lamborn's.....  
Adjustable, Lambert's.....  
Adjustable, Sargent's.....  
Adjustable, Steam's.....  
Cabinet, Sargent's.....  
Eberhard Mfg. Co.....  
Warner's.....

**Clips.**  
Azle and Spring Bar, Norway Iron.....  
Wrought Iron Felloe Clips.....

**Coal Hods.**  
Sidney Shepard & Co.'s list.....  
Iron Clad Mfg. Co.'s and list.....  
Steel Coal Hod, Framing & Co., L. & J. White.....  
Whiting & Co., Japaned.....  
Whiting & Co., Galvanized.....

**Coal Vases.**  
W. H. Moore, S. S. & Co.....  
Buffalo Common, B. S. & Co.....

**Cockeyes.**  
**Cocks, Brass.**  
Hudson.....  
Globe.....  
Plain Bibbe.....  
Ailsa Beer.....

**Coffers.**  
Board and Box.....  
Senior's Patent.....  
Steel, Wrought Iron, and Cast Iron.....  
The "Swift" Lathe Box.....  
Webb's Patent.....

**Compasses, Dividers, &c.**  
Compasses.....  
Callipers.....  
Dividers.....  
Bemis & Call Co.'s Dividers.....  
Bemis & Call Co.'s Compasses and Callipers.....  
Bemis & Call Co.'s Wing & Inside or Outside.....  
Bemis & Call Co.'s Double.....  
Bemis & Call Co.'s (Call & Pair) Inside.....  
Excelsior.....  
Cook's Extension.....  
Callipers and Dividers.....

**Coppers' Tools.**  
Bradley's.....  
Barton's.....  
Hartman & Co.....  
Albertson Mfg. Co.....  
John Beatty & Co.....

**Corkscrews.**  
Humason & Beckley Mfg. Co.....  
Clough's Patent.....  
Howe Pros. & Hubert.....  
Bradley's.....  
Wadsworth's.....  
Grain.....

**Crow Bars.**  
Cast Steel.....  
Iron, Steel, Polished.....

**Curry Combs.**  
Hitch.....  
Carriage.....

**Curtain Pins.**  
Silvered Glass.....

**Cutlery.**  
Beaver Falls and Booth's.....  
Wholesale.....  
Wootenholme.....

**Dividers.—See Compasses.**

**Dog Collars.**  
Embossed Gift, Pope & Stevens' list.....  
Leather.....  
Pope & Stevens' list.....

**Door Springs.**  
Torrey's Rod, regular size.....  
Torrey's Rod, extra.....  
Bee Rod.....  
Warner's No. 1, & No. 2.....

**Drill Bits.**  
No. 1, Large Japanned.....  
No. 2, Medium Japanned.....  
No. 3, Small Japanned.....  
No. 4, "Shoo Fly" Screen Door size.....  
No. 5, "Shoo Fly" Screen Door size.....  
No. 6, Medium.....  
No. 7, Large.....  
Galvanized and Nickel Plated.....  
Victor Coll.....  
No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.....  
Philadelphia.....  
Cowell's.....  
Rubber, complete.....  
Shaw Door Check and Spring.....  
Elliot's Door Check and Spring.....  
Douglas & Witherby.....  
Merritt.....  
L. & J. White.....  
Bradley's.....

**Drills and Drill Stocks.**  
Blacksmith's.....  
Brest, P. S. & W.....  
Brest, Wilson's.....  
Brest, Parker's.....  
Brest, Bartholomew's.....  
Ratchet, Merrill's.....  
Ratchet, Parker's.....  
Ratchet, Whitner's.....  
Ratchet, Estlin's.....  
Ratchet, M. & T. Trippl, Action.....  
Whitney's Hand Drill, Plain.....  
Automatic Boring Tools.....

**Drill Chucks.**  
Morse's Adjustable.....  
Danbury.....  
Per 2.....

**Egg Beaters.**  
National.....  
Family T. & S. Mfg. Co.....  
Kingston.....  
Acme.....  
Armstrong & Co.'s Mfg. Co.....  
Advance, No. 2.....  
Bryan's.....  
Emery.....  
Regular.....  
For Emery Paper and Cloth, see Sand Paper.

**Enamelled and Tinned Ware.—see Hollow Ware.**

**Escutcheon Pins.**  
Iron and Brass, list Nov. 11, 1885.....  
Door Lock.....  
Brass Taread.....

[illegible]

**Hinges,** No. 8, 6 in. cut.....  
Broad Hatchets, No. 3, 4 in. cut.....  
Broad Hatchets, No. 3, 4½ in. cut.....  
Broad Hatchets, No. 6, 5 in. cut.....  
Broad Hatchets, No. 6, 5½ in. cut.....  
**Hunt's Shingling Lath and Claw**.....  
Hunt's Broad ..... dis 40¢ @  
Yerkes & Plumb..... dis 40¢ @  
Underhill Edge Tool Co., ..... dis 40¢ @  
Farrington & Son..... dis 40¢ @  
Simmons..... dis 40¢ @  
Peel's..... dis 40¢ @  
Collins, following list.....  
Shingling, Nos. 1, 2, 3.....  
Lathing, Nos. 1, 2, 3.....  
Selling.....  
**"Hay Knives,"** .....  
    "Lighting" .....  
Electric.....  
Wadsworth's.....  
Heath Patent.....  
Cutting Secdie.....  
**Hinges.**.....  
**Wrought Iron Hinges—**  
strap and T.....  
Strap.....  
Heavy Welded Hook.....  
Screw Hook and Eye.....  
Rolled Blind Hinge, Nos. 32 and 34.....  
Rolled Blind Hinges, Nos. 2-32 and 234.....  
Roll Raising.....  
Plate Hinges 8, 10 and 12 in.....  
Spring Hinges.....  
Geer's Spring and Blank Butts.....  
American Spring Hinge Co.'s.....  
Antique Spring Hinges.....  
Gem Spring Hinges.....  
Barker's Double Acting.....  
Bommer's.....  
Buchman's.....  
Chicago.....  
Acme.....  
Climax.....  
**Gate Hinges:**.....  
Western.....  
N. E. Beaverville.....  
Clark's, Nos. 1, 2, 3.....  
Automatic.....  
Common Sense.....  
Beymour's.....  
Shepherd's, Nos. 1, 2, 3.....  
Shepard's Lathe and Hinge.....  
**"Handled"**.....  
Garden, Morton, &c.....  
Warren Hoe.....  
D. & H. Scovill.....  
Lane & Gale, S. & O. Pat.....  
Sanduck Tool Co., ".....  
Hubbard & Kewell.....  
**Horn Hinges and Ringers**.....  
Hill's Improved Ringers.....  
Hill's Old Style Ringers.....  
Hill's Ringers.....  
Perfect Ringers.....  
Blair Rose Ringers.....  
**Holding Apparatus**.....  
Moore's Hand Hold, with Lock brake.....  
Diffusing Rings, Stock City.....  
**Hollow-Ware, Iron.**.....  
Stove Hollow Ware, Ground.....  
Stove Hollow Ware, Unground.....  
Kettles.....  
Oval Boilers, Saucepans and Glue Pots.....  
Agate and Granite Ware.....  
Basin-Hollow Ware.....  
Inch.....  
Cast Iron.....  
Bird Case, Sargent's list.....  
Clothes Line, Reading List.....  
Clothes Line, Sargent's list.....  
Ceiling, Sargent's list.....  
Coat and Hat, Sargent's list.....  
Coat and Hat, Reading.....  
Cotton.....  
Cotton Pat. N. Y. Mallet & Handle Wk'l.....  
Tassel and Picture T. & S. Mfg. Co.,.....  
Bench Hooks.....  
**Wire—**  
Wire Coat and Hat, Genl.....  
Wire Coat and Hat, Miles'.....  
Bell.....  
Grass.....  
Hooks and Eyes—Malleable iron.....  
Hooks and Eyes—Brass.....  
**Horse Nails.**.....  
Ausable.....  
Clinton, Cin.....  
Clinton, Fin.....  
Easex.....  
Vulcan.....  
Northwest.....  
C. R. K.....  
New Haven.....  
Bridgeware.....  
Champion.....  
Capewell.....  
N. Y. Commission on above quotations  
quently made to careful buyers.  
**Horse Shoes—** Furdan, at factory.....  
P. Horse Shoe Co., Furdan Imp., at fac.....  
**Hort.**.....  
Walker's Pores.....  
Hose Hubber.....  
N. Y. B. & C., Standard.....  
**Ice Aps, Chisels, &c.**.....  
American Ice Chisel.....  
Rovers & Ice Breakers.....  
Miller's Sliding Head Pick.....  
Wood Head Picks Sargent's.....  
Iron Head Picks, Sargent's.....  
Ice Axes, Small Cast or Mall.....  
Combination Ice Tools.....  
**Ice Cream Freezers.**.....  
Buffalo Champion, S. S. & Co.....  
**Ice Tengs.**.....  
Champion, S. S. & Co.....  
**Jack Screws.**.....  
Millers Falls list.....  
**Kettles.**.....  
No. 7 to 17 lb. Inclusive.....  
Enamelled and Tea Tinches.....  
**Keys.**.....  
Parkinson Patent Dec. 18, 1895.....  
Hotchkiss' Brass Blanks.....  
Hotchkiss' Copper and Tinned.....  
**Knife Sharpeners.**.....  
Parkin's Apprehend Handles.....  
Parkin's Rosewood or Cocobolo.....  
**Knives.**.....  
Ames' Butcher Knives.....  
Nichols' Butcher Knives.....  
Ames' Bread Knives.....  
Moran's Shoe and Bread Knives.....  
Hay and Straw.....  
Table and Pocket.....  
Door Mineral.....  
Door Por. Jap'd.....  
Door Por. Fluted.....  
Hemacetic Door Knobs, new list.....  
Tale & Turner Wood Saw.....  
Farmhouse Plain.....  
Base, Bull's Tip.....  
Floor, Budd's.....  
Picture, Hemacetic.....  
Carriage, Japanese.....

[illegible]



**THE AMERICAN DYNAMO ELECTRO-PLATING MACHINE.**

**Best Plating Machine in the Market.**

**HEADQUARTERS FOR EVERYTHING IN THE PLATING AND POLISHING LINE.**

**Zucker & Leven Chemical Co.,** 538 to 564 W. 16th St., 36 to 40 11th Ave., NEW YORK, U.S.A.







## INDUSTRIAL ITEMS.

## MAINE.

The Eastern Forge Co., of Portland, are making forgings for 12 locomotives, part for the O. C. R. R. and part for the Boston and Maine Railroad. They have just finished the forgings for the new steamer now being built at Bath for the Maine Central Railroad, and are figuring on forgings for 25 engines for the New York elevated railroad.

## MASSACHUSETTS.

The Fitchburg Steam Engine Co., of Fitchburg, report that they are fairly busy, and that their indications for the coming year for work are promising. They are now building a 250-horse-power engine for a Brockton firm and a good number of smaller engines for other places. They are running full time with their average number of men.

The Lawrence Machine Co. have just finished a 24-inch independent centrifugal pump, which is coupled to an 80-horse-power Westinghouse engine. It is for plantation drainage in Louisiana.

Messrs. Beaudry & Cunningham, of Boston, have recently taken an order from the Granite Hames Works, of Sunapee, for a 50-pound Beaudry cushioned hammer. Among their latest shipments may be mentioned a 300-pound upright cushioned hammer to the Colwell Iron Works, of New York, and a 50-pound upright cushioned hammer to Messrs. Easton & Burnham, of Pawtucket, R. I.

## CONNECTICUT.

The Bigelow Co., New Haven, have recently added to their machinery a direct-acting belt-punch weighing 15 tons, with 6-foot throat.

The Chaplin Mfg. Co., Hartford, have removed to Bridgeport, where they have the building formerly occupied by the Coulter & McKenzie Machine Co. Mr. McKenzie, late of the latter firm, will have charge of the new factory. With increased facilities the company will be able to turn out larger quantities of their patent roller bearing, which is applied to street railway cars, machinery journals, &c.

D. E. Whiton, manufacturer of machinery, West Stafford, will remove to New London about April 1, where he has built a factory 70 x 130 feet. The machine shop is 96 x 70 feet, well lighted and conveniently arranged. The remaining portion of the building is two stories high, and will be divided into offices, packing and shipping rooms, &c.

## NEW JERSEY.

Pequest Furnace (anthracite) has just blown in.

## PENNSYLVANIA.

The Kensington Engine Works, Limited, of Philadelphia, are just completing the erection of three engines, with all the necessary fixtures, piping, feed-water heaters, &c., for the Chester Electric Light and Power Co., Chester, Pa. The station, which was designed by Mr. G. P. Denis and the Kensington Engine Works, Limited, is said to be one of the most complete that has been put up. The engines are the Buckeye Quick Speed, with two band-wheels, driving direct to the dynamos.

Dunbar Furnace is now turning out Bessemer iron.

The wages of the molders in the employ of the Reading Hardware Co., at Reading, have been advanced 10 per cent., taking effect on the 1st inst. The molders were reduced 10 per cent. in July, 1884, and this is now restored to them.

Spearman Furnace (anthracite), in the Shenango Valley, was in blast but 15 days last month, being banked the balance of the month on account of the coke strike. They will blow in both stacks as soon as they obtain a supply of coke.

Katherine Furnace (anthracite), in the Lower Susquehanna Valley, has just blown in.

Hecla Furnace (charcoal) blew out in the latter part of February to put in a new hearth.

The molders in the employ of the Mt. Penn Stove Co., at Reading, have had their wages increased 10 per cent., taking effect on the 1st inst.

Pennsylvania Furnace (coke) has blown out for the purpose of relining.

Mabel Furnace (coke), in the Shenango Valley, which shut down on the 4th ult. on account of the coke strike, blew in again on the 1st inst.

Sharon Furnace (coke), in the Shenango Valley, blew in on the 24th ult.

A company with a capital stock of \$100,000 have been organized at Reading, with Mr. Geo. P. Gauster as president, for the purpose of manufacturing clocks. The organization is called the Self-winding Clock Co., and the members so far consist of New York parties, excepting Mr. Gauster, who is a resident of Reading.

The blast furnace at Frankstown, Blair County, owned by the Cambria Iron Co., of Johnstown, has been leased for a term of five years by James Pierrepont, an extensive ore operator of Stormstown, Center County. The furnace has been idle for three years. It will be blown in as soon as the necessary repairs have been made. The furnace will be used to make a pig adapted to the manufacture of Clapp-Griffiths steel.

In the Connellsville coke region at the present time there are 2340 ovens idle out of a total of 10,832. These idle ovens are classified as follows: Pool percentage shut down, 373; other pool ovens idle from local strikes and other causes, 1290; furnace ovens, 500; old ovens, 177.

Gillinder & Sons, glass manufacturers, at No. 135 Oxford street, have leased the old East Liverpool Glass Factory, which is within the natural-gas belt of Ohio. The glass house is one of the most complete in the United States. Gillinder & Sons are among the largest glass-manufacturing firms of the country, and this move is expected to

have a tendency to bring other glass factories within reach of the natural-gas supply. The establishment in this city, which employs about 900 hands, will be run in connection with the East Liverpool factory. A representative of the firm said yesterday that the new factory would be in operation by the 1st of August. The comparative cheapness of the natural-gas process of manufacturing glass and the increased rapidity of production are given as the reasons for the firm's action.—*Philadelphia Record*.

The Keystone Plow Works, of New Castle, have received orders from Michigan for five carloads of plows.

No. 1 Furnace of the Crane Iron Works, at Catsaqua, has been blown out, owing to needed repairs, which will be accomplished at an early date. No. 4 is being relined and gotten ready for operation.

Sterling & Weidner, proprietors of the West Reading Boiler Works, Reading, have received the contract to raise the Tipton Furnace stack 15 feet higher. The iron stack is 26 feet in diameter. They are also furnishing a new 60-horse-power boiler and new iron stack for E. S. Fox & Co.'s terracotta and fire-brick works, Reading.

It is rumored that Messrs. P. Matheson & Son, proprietors of the American Tube and Iron Co., at Middletown, are contemplating the removal of their entire works to Youngstown, Ohio.

After a successful blast of over four years No. 2 Furnace of the E. & G. Brooke Iron Co., Birdsboro, will soon blow out, and the No. 3 Furnace, on the P. & R. side of the river, and owned by the same company, will be put in operation. The work of relining and repairing the No. 2 Stack will be pushed forward as rapidly as possible in order that it may be ready to work in conjunction with the steel plant now being erected.

A natural-gas company, composed of Albert Scott, J. J. Hazlett, Sheriff John M. Stewart, Leonard Keck and others, were organized in Greensburg last week. The gas will be supplied from an abandoned well on the Peter Swail farm, which is about 3 miles from Greensburg. They agree to supply gas to consumers for 50 cents per fireplace per month, and also to have the necessary pipes for conveying it laid to the town and through the principal streets inside of four months.

Lindsay, Parvin & Co., Philadelphia, have just closed a contract to furnish plates, angles and deck beams for the Vanderbilt yacht, which are all to be of the best open-hearth steel. They have placed the order for plates with the Linden Steel Co., of Pittsburgh, and the angles and beams with the Pencoyd Iron Co., of Philadelphia. Lindsay, Parvin & Co. also furnished all the material for the Astor and Gerry yachts.

The Stokes & Parrish Machine Co. are furnishing a complete outfit, furnace hoist, &c., for the Eagle Hill Iron Co., Montgomery County, Pa. They are also putting a fine passenger elevator in the Lehigh Valley Railway Co.'s building, Third street, Philadelphia.

## PITTSBURGH AND VICINITY.

The Braddock Wire Works Co. have been organized, with William Edenborn, of St. Louis, as president; W. H. Rowe, secretary and treasurer, and Lieut. Thomas W. Fitch as superintendent. The foundation for their wire mill at Braddock is completed and everything ready for the structure, which will be erected as soon as the weather will permit. The machinery is already built, and the company expect to have the mill in operation by June. All three of the gentlemen are interested in the manufacture of barbed wire in St. Louis, and one of the chief objects of the mill is to make their own wire. Mr. Edenborn remains in St. Louis, but Mr. Rowe, the secretary and treasurer, has moved to Pittsburgh and will remain permanently.

A new concern, known as the McKeesport Enamel Brick and Tile Co., are negotiating for a site in McKeesport for their factory.

A charter was granted at the State Department last week to the Russell Mfg. Co., of McKeesport. The capital stock is \$100,000.

Mr. Bacon, who has for a number of years been at the head of the Canton (Ohio) Glass Works, has, with a number of other gentlemen, purchased a site at Homestead, and will erect thereon a large tableware factory. The new concern will be one of the largest in the Monongahela Valley, and will be finished as rapidly as the contractors can complete their work. The furnace will be either a Nicholson or Gill gas structure, and will be either a 10 or 12 pot one. It is understood that the site purchased consists of about 5 acres, most of which will be utilized by the buildings necessary for the operations of the new concern. Gas will be brought from the Murrysburg field as fuel. About 500 men, boys, women and girls will be employed.

Challinor, Taylor & Co., at Tarentum, are erecting a new tank furnace in which to melt glass. The furnace will be ready for use in a few weeks.

A number of foreign capitalists are making arrangements to convert the old Eagle Cotton Mill, on Isabella street, Allegheny, into a factory for decorative brasswork.

On Thursday morning of last week one of the boilers in Hussey & Co.'s mill exploded and broke the natural-gas pipe connecting the furnace. The escaping gas immediately ignited and set fire to the lower portion of the structure, known as "the old mill." The damage was about \$10,000.

Isabella Furnace No. 1, which blew out on January 10, 1884, for the purpose of relining, blew in again on Monday, the 8th inst. Furnace No. 2 is still in blast on mill iron, making about 200 tons daily.

Mr. P. H. Lauffman has commenced the erection of his new mill at Apollo, on the West Penn R. R., and it will be under roof by the middle of April. The building itself is of iron, and will be 90 x 200 feet and 18

feet to the square. The contracts for the machinery have been let, and, when finished, it is said it will be the most complete mill of the kind in the country. The new firm will be known as the P. H. Lauffman Co., Limited. It has a capital of \$100,000, and is composed of P. H. Lauffman, his brother William Lauffman, and his son W. B. Lauffman. The output of the mill will be 4000 tons of fine sheet per annum, and will consist of sheet iron, sheet steel, decarbonized steel and electro-copper and nickel plate. Mr. Lauffman will also use in his new mill his patent damper, annealing furnace and gas producer. A coal bank lies within 50 rods of his establishment, and he is only 2 miles from natural gas. Mr. Lauffman expects to begin operations by the first of August.

It is reported that a party of Pittsburgh capitalists are negotiating with the representatives of the Jacobs estate for the purchase of the Snowden Iron and Machine Works, at Brownsville, for the purpose of converting them into a nail works.

Messrs. Goodman & Hogan will erect a foundry in connection with their present shops at the corner of South Fifteenth and Neville street, Southside.

A steel bloom weighing 735 pounds has been rolled into a shaft 4 inches in diameter and 20 feet long at the 18-inch mill at the Hartman Steel Works, Beaver Falls. This is the largest bloom ever rolled at these mills.

A charter was issued last week to the Washington Natural Gas Co., which propose to produce gas in Mt. Pleasant, Cross Creek and Hopewell Township, Washington County, and furnish it to the people of Pittsburgh and Allegheny and intermediate points along the company's pipe lines. The capital stock is \$500,000, and the principal stockholders are Edward Ford, E. L. Ford and William Nelson, of Pittsburgh; R. K. Jamison, the Philadelphia banker and G. D. Simon, of Allegheny. The Westmoreland and Cambria Natural Gas Co., of Pittsburgh, capital \$25,000, were also chartered. They propose to supply Johnstown, among other cities.

W. D. Wood & Co., of McKeesport, are preparing to lay a natural-gas line from the Murrysburg field to their mills. The company have secured a tract of territory in the southwest of the field and are drilling a well upon it.

The old Gill Car Works, on Preble avenue, Allegheny, have been bought by a number of capitalists and will hereafter be operated as the Union Foundry and Machine Co., Limited. The new company will manufacture steam, water and gas fittings and general specialties, and have a capital stock of \$200,000. The new firm was organized last week. The Otto Specialty Machine Co., of Allegheny, have been merged into the new company. They are placing about \$20,000 worth of new machinery in the new building and expect to commence operations April 1. The new company is composed of G. N. Hoffot, John A. Mitsch, F. N. Hoffot and C. H. Phillips, late of Speer & Co. Mr. G. N. Hoffot is chairman, John A. Mitsch secretary, and F. N. Hoffot treasurer, of the new firm. Mr. Phillips will be manager.

Señor Carlos Zarembo, special agent of the Mexican Government, was in Pittsburgh recently and closed negotiations with the Allegheny Electric Light Co. for a portable engine to be used in lighting an excursion train with electricity. The train which is to have this wonderful improvement is to be used to convey a large party of merchants and manufacturers from different parts of the North to Mexico on a tour of inspection. Señor Zarembo stated that Pittsburgh was the only city in the world wherein an engine of the kind he desired could be purchased.

Work has been begun on the foundation of the new glass factory at Homestead. The works will be a 10-pot furnace for making fancy tableware, and will employ about 200 men and boys.

Messrs. H. Lloyd, Son & Co., proprietors of the Kensington Iron Works, Pittsburgh, commenced to use natural gas as a fuel on Monday last. This firm formerly used 2000 bushels of coal per day.

## OHIO.

The steel works department of the Bellaire Nail Works, at Bellaire, are closed for the present, owing to a demand by the men for an advance in wages which the firm refuse to grant.

Hamilton Furnace (coke), in the Hanging Rock region, blew in this week.

Sarah Furnace (coke), in the Hanging Rock region, now out of blast, will blow in about April 15 next.

Baird Furnace (coke), in the Hocking Valley district, is now out of blast, making improvements and enlarging capacity. It will blow in again in April.

Wallace Banfield & Co., Limited, purchased in September, 1885, the rolling mill located at Ironton, Jefferson County, which they have rebuilt and just put in operation. The mill contains two furnaces that are used for working up scrap, and has capacity to turn out a large amount of sheet steel, the business of the establishment being the rolling of steel billets into sheets.

Receiver Fayette Brown, of the Brown, Bonnell & Co. Iron Works, at Youngstown, filed a complete report in the United States Circuit Court at Cleveland on Monday, the 1st inst., from the time matters were placed in his hands, February 21, 1883, to December 31, 1885. It shows a gain of \$352,244 29 during his management.

Staubsville Furnace (coke), which has been recently bought and thoroughly repaired by the Riverside Iron Works, of Wheeling, W. Va., blew in on the 3d inst.

The Mahoning Electric Light Co. have been organized at Youngstown, with a capital of \$40,000, the following directors being elected: C. H. Andrews, George Tod, John C. Wick, William J. Hitchcock and A. B. Cornell. The directors elected George Tod as president, and A. B. Cornell as secretary and treasurer. The new company own the franchise secured by the Thomson-

Houston Electric Light Co., of Boston, to light the city, and will fulfill their contracts. The officers and directors are the same as those of the Youngstown Gas Co.

On the evening of the 5th inst. the large establishment of Bakewell & Mullins, at Salem, was completely destroyed by fire. The firm were manufacturers on a large scale of architectural sheet-metal ornaments. The fire originated in the stamping department, where the most valuable machinery was located, which was completely destroyed. The loss amounted to between \$40,000 and \$50,000.

Zanesville Furnace, which has been out of blast for some time, is only awaiting a supply of coke, when it will immediately blow in.

The Champion Reaper Works, at Springfield, discharged between 600 and 700 men last week, on account of the men being connected with the Knights of Labor organization. Mr. Whitely, the president of the company, in an interview stated "the works will be running full this week with non-union men."

The Smith & Haldeman Elevator Co., of Toledo, inform us that they have made important improvements in their direct compound hydraulic elevators. Last season they built of this class a handsome passenger elevator for the Baltimore and Ohio Railway general offices. They did two-thirds more business the last three months of the year than they did all the balance. Their prospects for trade the coming season are encouraging. They turn out all kinds of freight and passenger elevators, shafting, pulleys and hangers and general machinery. Last June they organized a joint stock company of \$75,000 capital. R. E. Haldeman, president; J. C. Chambers, vice-president; W. H. Hains, secretary; E. H. Van Holsen, treasurer.

The Dayton Coal and Iron Co., Limited, have recently established an office in the Johnston Building, Cincinnati, under the management of Mr. W. J. Isaacson.

## ILLINOIS.

Seventy nail machines are now in operation at the works of the Calumet Iron and Steel Co., at Cummings. Their product, the company state, is satisfactory both in quality and quantity. The bar iron and open-hearth steel plants are in full operation.

A 10-ton Bessemer plant complete and a 25-inch rail train, with a 2000-horse-power engine to drive the same, are among the new additions to the plant of the Union Steel Co., Chicago. The company have also rebuilt two blast furnaces having each a capacity of 100 tons per day. The blast furnaces of the company are now ready to blow in as soon as a supply of coke can be had. Up to January 1st last over \$500,000 had been expended in improving these works. It is the purpose to have the entire plant in running order by June 1st next.—*Industrial World*.

A controlling interest in the Union Foundry and Pullman Car Wheel Works, at East Roseland, has been bought by the Pullman company, and George M. Pullman has been elected president, A. Davies auditor, and E. G. Shumway general manager. The works are large and were owned principally by N. S. Bouton and others before the transfer.

## MISSOURI.

A number of employees of the Crystal City Glass Works have just been discharged because of their failure to comply with the company's demand that they should withdraw from the Knights of Labor.

The Empire Saw Works of the Curtis & Co. Mfg. Co., at St. Louis, have an order in hand, given by a customer in Indiana, for a 74-inch circular saw. This monster saw, for which a special plate had to be ordered, will be used without a top saw on logs of unusual size, and if successful another of similar proportions may be taken. The works will probably increase their time to 10 hours on the 15th of March.

## WISCONSIN.

The employees of the J. I. Case Plow Works, at Racine, numbering over 100, have gone out on a strike to enforce a demand for the restoration of former wages, which were cut 10, 15 and 25 per cent. about a year ago.

## MARYLAND.

All the furnaces in the vicinity of Baltimore are now out of blast and have been for several months. Catocin Furnace (anthracite), which was banked last month on account of being unable to obtain a supply of coke, has blown in again.

No. 3 Ashland Furnace (anthracite) has been leased by the Pennsylvania Steel Co. and will soon be put in blast.

## TENNESSEE.

The Dayton Coal and Iron Co. have completed a coal bunker near their coke ovens which holds 15,000 tons.

Citico Furnace (coke) has blown out on account of the lining of the stack near the top giving away. It will blow in again as soon as repairs are completed.

## VIRGINIA.

Beverly Furnace (charcoal) will go in blast on the 12th inst.

## WEST VIRGINIA.

Belmont Furnace (coke) is out of blast, making repairs.

The Whittaker Iron Co., Wheeling, have just started a pack-cutting shear having knives of 11 feet length. This machine was made by the Lewis Foundry and Machine Co., of Pittsburgh, Pa.

## KENTUCKY.

Ashland Furnace (coke) is making repairs and will go in blast soon.

## GEORGIA.

The *Industrial South* says: "There is a movement being made by the Cherokee Iron Co. to establish a colony on a tract of

1600 acres of land in Polk County, one of the richest mineral-bearing and farming counties in Georgia."

## ALABAMA.

Messrs. Aikin & Lighton, of Birmingham, report a rapid increase in their business. They have added another cupola, which gives them a daily capacity of 24 tons. Their molding machine, recently described in our columns, is meeting with a good deal of favor among foundrymen. Their sash-weight business also has increased very rapidly, and they are now receiving inquiries from New York, Philadelphia and Pittsburgh. From this date they will make a specialty of castings for cotton gins, and will add to their list of manufactures the Jones tramcar-wheel. This will necessitate the enlargement of their foundry floor in the near future.

The Smith Sons Gin and Machine Co., of Avondale, a suburb of Birmingham, have completed the first story of their building. It will be one of the largest and most substantial structures in that locality.

The Williamson Iron Co., of Birmingham, are making rapid progress in connection with their furnaces. The boilers are in place and the workmen are approaching the tops of the stacks. Mr. C. P. Williamson, the president of the company, is giving the work personal attention.

All of the Georgia Pacific Railroad's extension from Coalburg to Day's Gap has been let, and nearly all of the contractors have gone to work.

Work has begun on the union passenger depot at Birmingham. Chas. Pierce, of Indianapolis, Ind., is the contractor.

Right of way has been granted for a third street railroad in Birmingham, to be called the Birmingham and Pratt Mines.

The Brooklyn Electric Construction Co. have commenced work on the electric-light plant for the city of Mobile.

## Coal Market.

The Anthracite Coal trade was never more unsettled than now, and the general drift from week to week is no better. Indeed there is a steady weakening of prices, with no prospect of a change until some agreement can be reached to check production, which is largely in excess of ordinary demands. At all points there is accumulation until car space, sidings and storage room are fully taken up. In a single word, the trade is congested. Wholesale jobbers and agencies profess to give no regular quotations, each transaction being governed by special circumstances. We hear of \$3.25 alongside for Stove, \$2.80 for Grate and Egg, and \$3 for Nut. Actual sales, however, are, confined to a petty local trade with rare exceptions, no large contracts having been concluded as yet this season, so far as reported. As by common consent, buyers keep out of the market, to await some new turn in events, apparently expecting to jump in at the right moment and provide for themselves should there be signs of any. Dealers and operators therefore feel that a scramble for Coal is by no means among the remote possibilities. As nearly as can be learned, most of the companies are inclined to the belief that Gowen is the strongest party in the field, and are inclined to regard his schemes with favor, although confessedly on account of his supposed antagonism with the Pennsylvania Railway Co., who, from the first, have been an impediment to unity of action. The reported reduction of tolls by the Lehigh Valley Railroad Co. is not yet known as a fact. The Pennsylvania Railroad Co. are said to be preparing cars for carrying Coal on a much larger scale than heretofore.

The total amount of Anthracite mined thus far in the year 1886 is 4,816,450 tons, compared with 3,281,173 tons for the same period last year, an increase of 1,535,277 tons. The Pennsylvania Railroad report that the total tonnage for the year thus far has been 2,270,182 tons, of which 1,926,179 tons were Coal.

The Bituminous trade is for the moment paralyzed by the miners' strike for 10 p. m. advance all through the Cumberland and Clearfield regions. So far as reported only one mine in the Clearfield district has been forced to suspend operations on account of the strike.

## A Chinese Method of Making Shovels.

—A Shanghai paper states that a novel branch of industry has recently sprung up at Chefoo. It is the manufacture of iron shovels. They are made from old boiler tubes. Hundreds of men and boys are now engaged in this business. The old tubes are cut into short cylinders, just the length of the shovel, and then ripped open, flattened out and hammered into shape. Piles of these old boiler tubes may be seen everywhere in the back courts of the native Hongs. Mule loads of these shovels are to be seen every day going into the country, and for 100 to 200 miles in the country there is now scarcely a farmer that has not an iron shovel. The prices vary from 25 to 40 cents apiece, according to quality, thus bringing this useful implement within reach of all.

A "Sun-and-Planet" engine, designed by James Watt, has still a place in the famous brewery of Messrs. Whitbread & Co., and is still performing the duty for which it was constructed in 1785. The *City Press*, London, says: "Though there have been alterations to increase its power, all the principal parts remain as they were originally manufactured. A metal tablet affixed to the engine gives an account of its invention and history."



## Exports.

The following list embraces the Exports of Hardware, Machinery, Iron, Metals, &c., from the port of New York, for the week ending March 9, 1886:

Danish West Indies.		Havre.	
Quant.	Value.	Quant.	Value.
Hdw., cs., 6	\$31	Mach'y, pkgs., 19	648
T. hoops, bbls., 20	87	Clocks, case, 1	64
Nails, kegs., 30	109	Nickel, case, 1	350
Mf. iron, pkgs., 80	778	Carbines, cs., 2	70
Ag imp., pkgs., 6	72	Copper, cs., 1085	16,800
<b>Copenhagen.</b>			
Clocks, cs., 2	97	Br. wire, bbls., 12	900
Hdw., cs., 14	392	Saws, cs., 60	300
Mf. iron, pkgs., 1	48	Sad iron, cs., 12	150
Ag. imp., pkgs., 24	522	Printing p's, 36	900
<b>Gottaburg.</b>			
Mach'y, pkgs., 1	50	Jap. iron, cs., 10	100
<b>Hamburg.</b>			
Hdw., cs., 156	1,563	Hdw., pkgs., 5	26
Mach'y, pkgs., 16	1,569	Sew. ma., cs., 2	100
Clocks, cs., 13	800	Nails, kegs., 40	108
Pumps, pkgs., 3	155	Mf. iron, pkgs., 35	237
Ag. imp., pkgs., 122	4,775	Copper, cs., 7	164
Sew. ma., cs., 481	10,147	Clocks, cs., 3	64
Mf. iron, pkgs., 5	50	Cutlery, case, 1	30
Faucets, bbls., 16	160	<b>Cuba.</b>	
Tinware, cs., 8	125	Mf. iron, pkgs., 207	1,193
<b>Christiania.</b>			
Car springs, 4	48	Hdw., pkgs., 107	1,506
pkgs., 4	48	Locomotive, 1	5,550
<b>Bremen.</b>			
Ag. imp., pkgs., 102	583	Nails, kegs., 2	30
Sew. ma., case 1	40	Boiler, 1	600
Hdw., cs., 21	941	Tin plate, cs., 2	28
Copper, cs., 21	941	Scales, cs., 15	390
Mf. iron, pkgs., 20	941	Ag. imp., pkgs., 100	650
Clocks, cs., 12	208	Car wheels, 100	650
Saws, case, 1	50	Sew. ma., cs., 315	1,153
<b>Antwerp.</b>			
Sew. ma., cs., 308	3,755	Iron safes, 4	210
Shot, keg, 1	14	Br. g'ds, pkgs., 4	319
Mach'y, pkgs., 41	4,000	Nails, kegs., 1	104
Copper, cs., 135	17,300	Tacks, cs., 14	100
Mf. iron, pkgs., 110	1,650	Iron, pkgs., 385	87
Hdw., cs., 17	274	<b>Bordeaux.</b>	
Pistols, cs., 2	700	Ag. imp., pkgs., 270	4,550
Arms, cs., 2	323	W. mills, cs., 2	75
Wringers, cs., 4	70	<b>French West Indies.</b>	
<b>Stettin.</b>			
Sew. ma., cs., 155	3,514	Clocks, cs., 47	797
Mf. iron, pkgs., 1	109	<b>Oporto.</b>	
<b>Amsterdam.</b>			
Sew. ma., cs., 202	4,592	Clocks, cs., 47	797
<b>Rotterdam.</b>			
Cutlery, cs., 36	320	<b>Mexico.</b>	
Pumps, pkgs., 3	90	Sew. ma., cs., 88	2,879
Sabres, cs., 31	900	Hdw., cs., 30	311
Gun sights, 2	900	Mf. iron, pkgs., 65	352
Copper, cs., 354	4,500	Nails, cs., 2	37
Hdw., cs., 49	896	Iron, pkgs., 2	37
W. closets, pkgs., 10	124	Per. caps, case, 1	40
Arms, cs., 2	124	Tinware, case, 1	10
Ag. imp., pkgs., 16	785	Cartridges, cs., 13	526
Gun bar's, case, 1	80	Nails, bbls., 3	50
Copper, cs., 90	11,250	Firearms, case, 1	181
<b>London.</b>			
Guns, cs., 6	798	Mach'y, pkgs., 78	14,878
Empty shells, 3	217	Nails, kegs., 2	14
Hdw., cs., 187	4,144	W. cloth, cs., 2	75
Ag. imp., pkgs., 6	537	Ag. imp., pkgs., 9	12
Copper, cs., 300	34,000	Shot, kegs., 8	99
Mach'y, pkgs., 7	1,298	Cutlery, cs., 52	1,327
Cartridges, cs., 50	1,026	<b>Haiti.</b>	
Bullets, cs., 4	60	Nails, bbls., 45	59
Oz. zinc, bbls., 104	2,309	Nails, kegs., 38	124
Sew. ma., cs., 10	301	Mf. iron, pkgs., 660	1,739
Saws, cs., 2	80	Hdw., pkgs., 35	287
<b>Liverpool.</b>			
Pumps, pkgs., 10	356	Sew. ma., cs., 6	45
St. imp., cs., 4	526	Cutlery, cs., 12	221
Rivets, cs., 4	54	<b>Venezuela.</b>	
Mach'y, pkgs., 60	10,823	Tinware, cs., 23	53
Clocks, cs., 287	5,775	Mf. iron, pkgs., 312	1,810
Tubing, case, 1	220	Nails, kegs., 34	66
Water meter, 1	60	Cutlery, cs., 12	221
Oil cups, bbl., 1	102	<b>San Domingo.</b>	
Guns, case, 1	139	Mach'y, pkgs., 29	433
Cutlery, case, 1	28	Nails, kegs., 78	273
Needles, case, 1	400	Iron, pkgs., 107	137
Copper matte, 1	400	Tinplate, bbls., 8	66
Sacks, 16,968	92,708	Hdw., pkgs., 31	592
Spliter, slabs, 1574	4,900	Iron, pkgs., 52	135
Stereo plates, 100	300	Tinware, cs., 7	153
Ag. imp., pkgs., 97	1,574	<b>United States of Colombia.</b>	
Iron pipe, pcs., 630	5,490	Sew. mach., cs., 177	3,337
Mf. iron, pkgs., 3	70	Hdw., cs., 220	3,905
Pumps, pkgs., 2	350	Mf. iron, pkgs., 216	1,780
Mach'y, pkgs., 2	350	Cutlery, cs., 70	1,010
<b>Leith.</b>			
Brass goods, case, 1	85	Cartridges, cs., 6	123
Ag. imp., pkgs., 1	15	Copper, cs., 16	76
<b>New Brunswick.</b>			
Tin crystals, 1	45	Ag. imp., pkgs., 51	1,181
Mf. iron, pkgs., 1	16	Sugar mill, 1	67
<b>British Australia.</b>			
Hdw., pkgs., 132	20,422	Nails, cs., 11	55
Wringers, cs., 17	1,125	Brass, case, 1	28
Rifles, case, 1	39	Nails, kegs., 349	973
Pistols, case, 1	37	Guns, case, 1	70
Mach'y, pkgs., 7	492	Clocks, cs., 3	129
Saws, cs., 4	183	Tacks, cs., 2	12
Ag. imp., pkgs., 33	1,108	Br. goods, cs., 17	340
Scales, cs., 6	15	Zinc, pkgs., 29	80
Clocks, cs., 3	102	Solder, case, 1	36
Cartridges, case, 1	10	Mach'y, pkgs., 319	11,144
Nails, cs., 27	306	Tinware, cs., 58	716
Tacks, cs., 2	28	Boilers, 2	8,561
Nails, kegs., 145	599	Pumps, pkgs., 3	58
Sew. ma., cs., 37	866	Saws, cs., 2	39
<b>Nova Scotia.</b>			
Mf. iron, pkgs., 3	32	Copper, cs., 1	59
Clocks, pkgs., 5	125	P. caps, case, 1	199
<b>Newfoundland.</b>			
Sew. ma., case, 1	50	Steel, pkgs., 49	425
Mf. iron, pkgs., 1	10	Nails, cs., 4	110
<b>British West Indies.</b>			
Hdw., cs., 39	607	Iron tubes, 80	115
Ag. imp., pkgs., 108	508	Sheet zinc, 8	177
Mach'y, pkgs., 3	111	Water-closets, 6	192
Oil tanks, 2	22	Bridge, 1	616
Pumps, pkgs., 3	70	Rifles, cs., 27	327
Nails, kegs., 126	494	Cartridges, cs., 1	35
Nails, cs., 10	105	<b>Central America.</b>	
Mf. iron, pkgs., 24	304	Hdw., cs., 17	300
Tinware, pkgs., 6	92	Mach'y, pkgs., 38	269
Sew. ma., cs., 7	106	Cutlery, cs., 2	149
Clocks, case, 1	29	Mf. iron, pkgs., 41	423
<b>British Guiana.</b>			
Mach'y, pkgs., 9	184	Ag. imp., pkgs., 142	4,799
Sew. ma., case, 1	50	Sew. ma., cs., 177	4,110
Mf. iron, pkgs., 6	71	Mach'y, pkgs., 4	590
Cutlery, case, 1	44	Mercury, flask, 1	35
Pumps, pkgs., 4	1,860	Tinfol, case, 1	21
<b>British East Indies.</b>			
Clocks, pkgs., 130	2,712	<b>St. Louis.</b>	
<b>New Zealand.</b>			
Ag. imp., pkgs., 171	1,413	ROGERS, BROWN & Co., St. Louis, W. H.	
Wringers, cs., 6	87	SHIELDS, manager, report, under date of	
Mach'y, pkgs., 18	144	March 8: The market continues irregular and unsettled. Some grades are plen-	
Wire g'ds, case, 1	85		
Pumps, pkgs., 10	150		
Iron, cs., 265	1,380		
Scales, cs., 16	387		
<b>Hong Kong.</b>			
Rifles, case, 1	84		
Cartridges, case, 1	84		
<b>Uruguay.</b>			
Hdw., pkgs., 76	734		
Ag. imp., pkgs., 194	1,051		
Pumps, pkgs., 10	150		

## Imports.

The following were the Imports of Hardware, Iron, Steel and Metals into the Port of New York for the week ending March 10, 1886:

Hardware.		Bailey Lang W.	
Blumenthal A. S.		Bars, 384	
Chains, cs., 2		Cary & Moen.	
Baker Hermann & Co.		Rods, coils, 425	
Hardware, cutlery & guns, pkgs., 74		Coddington T. W. & Co.	
Downing R. F. & Co.		Sheets, bbls., 323	
Machinery, case, 1		Sheets, bbls., 10	
Drexel, Morison & Co.		Crocker Bros.	
Arms, cs., 21		Ferro iron, tons, 792	
Eames Emil.		Ferro iron, lot, 1	
Sewing machines, cs., 10		Spiegel, tons, 106	
Field, Alfred & Co.		Herrman Thos.	
Mdse., cs., 6		Sheets, case, 1	
Folsom H. & D.		Sheets, bbls., 11	
Arms, cs., 9		Plates, 25	
Gordon Otto.		Ironclad Mfg. Co.	
Bundles, 317		Mdse., cs., 41	
Bales, 37		Lillienberg N.	
Henderson Peter & Bro.		Bundles, 2241	
Chain barrows, 8		Rods, coils, 1049	
Kaestler Adolph.		Pigs, cs., 12,253	
Cutlery, cs., 2		Lundberg Gust.	
Mdse., cs., 2		Rivet wire rods, coils, 1943	
Knauth, Nachod & Co.		Mason J. W. & Co.	
Machinery, cs., 2		Wire rope, coil, 1	
Mark & Co.		Morton, Bliss & Co.	
Lawn mowers, cs., 107		Girders, 20	
Mdse., cs., 4		Naylor & Co.	
Mer. Dia. Co.		Rods, pkgs., 12,462	
Pitkin & Holdsworth.		Wire, tons, 180	
Machinery, cs., 18		Pigs, 543	
Reed, Jos. H.		Wire, coils, 366	
Machinery, case, 1		Rods, coils, 6193	
Schroeder, Daly & Co.		Perkins C. L.	
Gales.		Spiegel, tons, 1000	
Guns, case, 1		Parson C. L. & Co.	
Shering & Glatz.		Silico spiegel, cs., 87	
Nails, kegs., 1		Pim, Forwood & Co.	
Taylor Thos.		Bars, 36	
Mdse., cs., 2		Flock & Co.	
The Yale & Towne Mfg. Co.		Rivet rods, coils, 862	
Case, 1		Wire rods, coils, 104	
Thelaud Bros.		Bundles, 36	
Machinery, case, 1		Rods, coils, 557	
Chains, cs., 12		Sheets, bbls., 46	
Wheeler, Messick & Co.		Stetson Geo. W. & Co.	
Machinery, pkgs., 3		Fig. tons, 898	
Wiebusch, Hilger & Co.		Weather Ludwig.	
Hdw. and cutlery, cs., 23		Wire, case, 1	
Anvils, 110		Whitney A. L. & Co.	
Wiemann E.		Galvanized iron, bbls., 100	
Cases, 5		Order.	
Witte John G. & Bro.		Pig, tons, 775	
Cutlery, cs., 29		Angle iron, bars, 294	
<b>Order.</b>			
Cases, 17		Wire rods, bbls., 1899	
Caeks, 5		Wire rods, pkgs., 995	
Nails, kegs., 300		Pipes, bbls., 12	
Rings, lot, 1		Wire, pkgs., 1262	
Machinery, cs., 10		Old rails, pcs., 380	
Sewing machines, cs., 102		Rails, 1294	
Machinery, pkgs., 11		Or. bbls., 107	
Packages, 9		Pipes, 69	
<b>Metals.</b>			
Bache, Samon & Co.		Rail crops, tons, 286	
Tinfol, cs., 10		Spiegel, tons, 200	
Baring Bros. & Co.		Rods, bbls., 5368	
Pieces, 358		Beams, 10	
Belcher Henry C.		Rods, coils, 11,902	
Packages, 35		Rods, pkgs., 218	
Baker Carl F.		<b>Black River, N. Y.</b>	
Mdse., cs., 9		Manufacturers of	
Cases, 6		MALLEABLE IRON WAGON JACKS.	
Cary & Moen.		Can be had direct from us or from following Houses:	
Mdse., cs., 90		PATTERSON BROS., No. 27 Park Row, New York City.	
Herrman Thos.		G. W. VAN TINE & SON, No. 504 Commerce St., Philadelphia, Pa.	
Galvanized steel, cs., 140		GOULDS & AUSTIN, No. 167 Lake St., Chicago, Ill.	
Cases, 400		J. B. HOTCHKISS, Nashville, Tenn.	
Mayer, Strause & Co.		A. F. SHAPELEIGH & CANTWELL HDW. CO., No. 144 N. Main Street, St. Louis, Mo.	
Cases, 10		Manufactured in Three Sizes, of the Very Best Malleable Iron.	
Mer. Dia. Co.		Warranted to lift any weight up to 7000 pounds.	
Steel shafts, 7		SEND FOR ILLUSTRATED CATALOGUE.	
Barv, pkgs., 7		<b>DOG COLLARS, LEATHER AND WIRE MUZZLES</b>	
Naylor & Co.		OF EVERY DESCRIPTION.	
Billets, 6749		<b>POPE &amp; STEVENS,</b>	
Rails, 1147		114 Chambers St., N. Y.	
Fraser Jas. & Co.		We manufacture a complete line of	
Type metal, ingots, 1008		<b>DOG COLLARS,</b>	
Rods, pkgs., 192		Of Gold, Silver, Brass,	
Power C. W.			



## THE WEEK.

No plan for electric subways, to supersede wires suspended on poles, has yet been decided upon by the commission having the subject in charge.

To protect convict laborers at work in the mines in Pulaski County, Ky., the Governor called out five companies of State militia.

John Bigelow, who visited the Isthmus of Panama as a delegate from the New York Chamber of Commerce to report on the progress of the canal, has returned to the city, after gathering much valuable information, but for the present he will make no public communication.

The trade and shipping returns of the Dominion for 1884-85 have been presented to Parliament. The public debt is now \$281,000,000, compared with \$242,000,000 the previous year. The annual interest payable on public debt is over \$11,000,000. The total revenue of the Dominion last year was \$38,797,000, and the expenditure \$350,370,000. Trade returns show that the total value of exports for the year was \$89,238,361, showing a decrease of over \$2,000,000. Compared with the preceding year the total value of imports was \$108,941,486, being \$8,000,000 less than in 1884. The customs revenue collected during the year was slightly over \$19,000,000, or about \$1,000,000 less than in 1884. The total exports to the United States amounted to \$39,752,734, and imports from there reached \$47,167,201. The returns show that the decline in trade with the United States is better maintained than that with Great Britain.

The Starbuck, one of the steamers just purchased by the Pacific Mail Co., will be put on the China route, going first to Hong Kong, via the Suez Canal, so as to be ready for the new crop of tea.

The New York longshoremen have decided in convention that they will no longer work with owners of horses or floating engines which are permitted on vessels worked by "outsiders" or sailors forming a ship's crew.

Engineer Paine, of the Brooklyn Bridge, advises the trustees that it would be desirable to have a duplicate system of engines and machinery, and also an extra cable laid alongside the present one, which could be used in case of an accident. The engineer has prepared plans for two condensing engines of 600 horse-power each. The cost of the extra machinery was averaged at \$40,000.

There is a hitch in the proposed commercial treaty between France and China.

The largest and most successful dredgers in use in excavating the Panama Canal are products of American skill and enterprise. The American Dredging Co. have a contract for excavating 30,000,000 cubic meters, and one-sixth of the work is done.

The Boston *Commercial Bulletin* is authority for the statement that the following rubber boot and shoe companies have united in a strong combination for offensive and defensive purposes: Boston Rubber Shoe Co., L. Candee Co., Woonsocket Rubber Co., Goodyear's M. R. Shoe Co., Hayward Rubber Co. All agencies hitherto maintained in various cities are to be discontinued, and the products of the five companies sold through the Rubber Boot and Shoe Selling Co., a corporation just organized under the laws of Massachusetts. The combination goes into effect April 1, and is to be accompanied by a substantial advance in prices.

Trade between New Orleans and Belize, Honduras, has grown until now three steamers a month are employed and usually loaded down with produce and manufactured goods.

Manager Emory, of the New York Steam Heating Co., whose works are on Greenwich street, this city, refused to restore to their service two engineers who had been discharged, as alleged, for drunkenness and neglect of duty, whereupon it was found necessary to obtain the services of 200 policemen in order to supply themselves with coal from barges on the North River. They now think that the difficulty has ended.

A great car-strike, which involved nearly all the horse-railroad lines in New York and Brooklyn, was settled on Friday afternoon through the intervention of Railroad Commissioner O'Donnell, who first visited the rooms of the Central Labor Union, in this city, and listened to statements of the causes of the difficulty. Thence he repaired to Brooklyn, where a proposition was submitted to the commissioner by President Richardson, of the Atlantic avenue road, conceding payment of \$2 per day of 12 hours to conductors and drivers. This was promptly accepted by the Executive Committee. The commissioner said with reference to his decision as arbitrator: "I am not a member of the Knights of Labor, nor of any other secret labor organization, but I am in full sympathy with all properly organized labor organization. It is too late for corporations or organized capital to object to labor organizing for its own protection. These labor organizations ought to be recognized by law and protected. Between intelligent labor and intelligent capital there will be no

conflict. It is only when selfish greed and ignorance rule that conflicts take place. To prevent such strikes in the future the Board of Railroad Commissioners ought to be empowered to act as a court of arbitration between the railroad corporations and their employees. The public ought not to be damaged, either in travel or otherwise, pending such disputes. The Board of Commissioners ought to have power to settle all such cases."

The Chinese minister at Washington writes a dignified dispatch to the Secretary of State, claiming indemnity from the United States Government for losses of life and property sustained by Chinese subjects in Wyoming Territory through mob violence. The fact that Spain received indemnity in a parallel case is not cited as a legal precedent, binding the United States in all its future international relations. "On the contrary," says the minister, "I understand that it was a voluntary act of good-will, above and beyond the strict authorisation of domestic law. But I do claim that it goes to show that there are high principles of equity and national comity, rising above the narrow limits of statutory law, which control the action of nations, and I heartily rejoice that the early, constant and steadfast friend of China, the great and enlightened Government of America, has done so much to bring the nations of the earth up to this high plane of international justice and fair dealing."

The House Committee on Naval Affairs have completed their report to accompany the bill providing for an increase of the naval establishment. After showing our absolutely helpless condition against an invasion from the sea, and the immense amount of destructible property in our principal seaports subject to the fire of an enemy's guns, the committee inquire what steps ought to be taken to increase our means of defense. As forts of iron and steel cannot, within any reasonable limit of cost, be erected so as to give protection wherever it is needed, the committee decide that the only practicable way is to afford such protection by means of a navy which can follow an enemy to every point of attack. After considering the types of vessels approved by foreign Governments, the committee recommend the construction of three vessels of the characteristics of these two classes: 1. The protected cruisers of 4000 tons and upward, protected by an armored deck, coal supply, and minute cellular division, of large coal capacity, and speed running up to 19½ knots. These vessels carry powerful batteries and torpedo outfits, and are designed as commerce destroyers and for other service in which great despatch is required. 2. Cruisers similar to the above of 3000 or 4000 tons displacement. Of these two classes the French, English, Brazilians, Japanese, Italians and Russians now have many vessels and are building others. The committee also recommend the construction of one torpedo catcher and four torpedo-boats.

The immigration into the United States during January aggregated 8749, compared to 6021 during January, 1885.

The Imperial Ottoman Government has decided to enter into negotiations for the details of new commercial treaties, and a commission to take charge of the matter has been appointed by the Sublime Porte.

A correspondent at Puerto Cortez, Central America, describes a railroad 36 miles long, which cost \$30,000,000. Lately trains have been started twice a week, under a new management, in which the engine is preceded by a hand car and competent officials, to protect passengers in the rear from accident.

The Duluth (Minn.) *Herald* says that a company with \$100,000 is being organized to build dry docks, &c., at some point on Lake Superior.

The late Charles Morgan, the surviving partner of whose domestic household has become famous as an admirer of the fine arts, was, 40 years ago, among the foremost of New York's shipping merchants. At the time when steamships had only begun to displace sailing vessels in our coastwise trade, Mr. Morgan, associated with Howard & Son ("Deacon Joe," of Brooklyn), engaged in the then formidable enterprise of establishing a through line between New York and New Orleans, beginning with the steamers Crescent City and Empire City, which made their trial trips down the harbor with a large number of invited guests on board. Mr. Morgan was a gentleman of plain, unpretentious habits, genial, and by no means reserved in his general intercourse. Unlike Mr. E. K. Collins, who embarked in the Liverpool enterprise, and unlike Mr. Ericsson and John B. Kitching, with their "caloric motor," Mr. Morgan had no reason to regret his venture, for the California gold discoveries eventually gave his steamers an enormously profitable business on the "Chagres route" across the isthmus, and the foundations of a fortune estimated at \$15,000,000 were speedily laid. About the time mentioned the Morgan Iron Works of Stillman & Allen, the Secor Iron Works and the Allaire were in their glory.

President Bodine, of the Manufacturers' Association, in Pittsburgh, says: "All the window-glass factories will be compelled to suspend operations in a very short time

unless the cost of production is considerably lessened. The importers are bringing in Belgian glass and selling it at a profit at less prices than the cost of production in this country. We have simply been keeping our factories in operation because no one liked to be the first to shut down."

A Toledo iron manufacturer predicts that in less than a year manufacturing in that city will be done with natural gas pumped through a 16-inch pipe from Findlay, Ohio.

An examination of the documents brings out the important fact that the concession from the Mexican Government under which Captain Eads proposes to build his ship railway if Congress will guarantee him the trifle of \$37,500,000, prohibits him from transporting naval vessels of the United States from one ocean to the other without the permission of the Mexican Government. Nor does it appear that reports of surveys or maps relating to the scheme are in possession of the Government at Washington.

Hon. Mr. McLelan, Canadian Minister of Finance, states that the gross debt of the Dominion on the first day of March, 1886, deducting the assets of \$72,791,877, is \$281,314,532, and of this amount the portion represented by temporary loans from banks or other parties in Canada and elsewhere is \$14,862,309; the addition to the net debt during the year was \$14,245,841.88. The expenditure on the public works of Canada from the first of July, 1867, to the 30th of June, 1885, is exactly \$186,483,712.

Charles Pratt, the well-known oil manufacturer, has given \$100,000 to the Adelphi Academy, Brooklyn, in order to enable that institution to extend its usefulness.

A loan of \$5,000,000 has been negotiated for the Congo River Free State, the first installment of what will probably prove a long series of loans to assist emigration, build a railway and improve the country.

Our former ministers to China, George F. Seward and John E. Ward, have given their opinions respecting the probability of an open rupture between China and England in consequence of the near approach of the latter to the Chinese frontier through Burma. Mr. Seward does not apprehend active hostilities. He has no doubt that the English intend to open that route of trade, but they will endeavor to go about their purpose judiciously, taking time for it, and to accomplish it with the co-operation of the Chinese themselves. It is only a short distance from Bahmo across the hills to the great southern bend of the Yang-tze River, and the latter is navigable for small craft almost from that point to the sea. The Provinces of Szechuen and Yunnan, the southwesternmost of the Empire, are very rich and populous. They are so far from the seaboard that trading with them from that direction is difficult. The trade which could be carried on with them by the Bahmo route might be expected to take large dimensions, to say nothing of the more general trade with the Empire which could be carried on by it. Mr. Ward surmises that the English may find it necessary to advance on Peking, in which case China, in the end, would pay heavy indemnities.

The suit of the city of Poughkeepsie against ex-Chief Engineer Brown, of the gas works, resulted in a verdict of \$47,875 in favor of the plaintiff, that being the amount of the claim.

A British company has obtained a concession from the King of Siam to work over 2000 square miles of teak forest in the Valley of Moun Guan, the rivers from which flow into the Menam, on which is situated the capital city, Bangkok.

The novelty of handling ships out of water on a railway of the Eads pattern is as yet an untried experiment, and yet the United States is asked to guarantee a large amount of bonds as a basis for subscriptions in furtherance of this object. As remarked by a commercial contemporary, "the United States ought not to become the financial sponsor of this or any other private job, for that phrase exactly describes the ship-railway project. It is a public measure in no other sense than that of tapping the Federal Treasury to the tune of \$2,500,000 annually for a term of 15 years."

It is stated that there has been formed a corporation, known as the Cotton Oil Trust Co., which controls 60 per cent. of the mills of the entire country. The capital stock is \$20,000,000, of which about \$17,000,000 has been issued to the mills bought by the pool.

A syndicate of business men in Haverstraw and Nyack have purchased the Alexander M. C. Smith line of steamboats and route privileges for \$45,000. The line comprises the steamboat Chrysenah, freight-boat Raleigh and ferry-boat Tappan Zee.

San Francisco papers take a very cheerful view of the transcontinental freight war, in the expectation of a large increase of trade. Where stock is not perishable, such as hardware, iron, steel and agricultural implements, merchants are likely to take advantage of low rates, especially as the markets are generally favorable to buyers. The only fear expressed is the danger of a glut of merchandise of certain descriptions, with resulting losses from competition. California trade in teas, sugar and wines, should cut rates continue, is likely to expand. The

San Francisco *Herald* says: "The Atchison, Topeka and Santa Fé have a through line to San Diego, where they can easily reach San Francisco by sea. They demand one-half of all the freight of Southern California. This we may be sure the Southern Pacific will never voluntarily relinquish, so that the prospects of a permanent lowering of rates are very good indeed. \* \* The result of all this will work a revolution in the fortunes of California and her sister States and Territories, from far within the British Border down even to the Isthmus of Panama. It will in the beginning probably work an injury to some of our manufacturers, but, on the other hand, it will allow our producers and manufacturers as well to seek markets further East, North and South than ever before."

An amendment to the charter of the New York Arcade Railway Co. is asked for in the Legislature, authorizing pipe galleries under the tracks instead of at the side, so as to enable the construction of four tracks, allowing freight, express and way trains. All pipes and wires must be placed in a commodious subway. The capital of the company is \$25,000,000. Property owners will be allowed to open their vaults upon the railway if they wish, but there is no compulsion.

The Studebaker Wagon Works, on the St. Joseph River, Illinois, employ 1200 men, and are said to be the largest in the world. In the smith shop there are 125 forges and 1500 feet of line shafting—550 of it in one continuous line—driven by two steam engines of 450 horse-power each. These engines, together with another at the carriage factory, of 50 horse-power, make a total of 950 horse-power for the entire works.

The movement for bridging the Mississippi at Memphis is being actively pushed and attracting the attention of railroad officials. City Engineer Merriweather is at work drawing the plans and specifications for this undertaking. A. P. Boller, an engineer in this city, has written to the authorities that the money necessary to complete the enterprise, amounting to \$5,000,000, had been subscribed and is now in bank in New York.

"France is in the midst of a commercial and industrial crisis," said M. de Freycinet, the Prime Minister, in the course of a debate last week. "The depression in trade," he added, "will not be remedied by the expulsion of the princes. Let us grapple with more pressing questions. France requires a calm just now."

The tea farms of South Carolina are well-nigh destroyed by freezing weather.

In reply to a question Mr. Wiman stated that the Baltimore and Ohio Railroad Co. own 255,000 of the 500,000 shares of capital stock of the Staten Island Rapid Transit Railroad Co., who propose to build the bridge.

Extensive changes will be made by the Pennsylvania Railroad Co. in Jersey City. Two other roads are interested—the Erie and the West Shore. It is proposed to establish a union depot about midway between the Pennsylvania cut and Erie tunnel. A double-track road is to be built from the Pennsylvania cut across and connecting with the Erie tracks to Weehawken, to unite with the West Shore tracks. Business will be facilitated, as cars can be easily transferred from one road to another without delay. The tracks that will wed the three roads will be built at once, provided the Jersey City authorities throw no obstacles in the way.

A pneumatic grain elevator, said to be capable of handling 100,000 bushels an hour, has been invented by Lyman Smith, of Cleveland, and a thorough test of its power is about to be made in that city by gentlemen from New York and elsewhere. The grain is forced through metal tubes by air pressure.

The Acme Liquid Fuel Co., of this city, propose to manufacture and supply fuel for heating and illuminating purposes. The capital stock is \$1,000,000.

Large meetings have been held in Sheffield, England, at one of which the mayor presided, with the object of devising measures of relief for the unemployed. The cutlery were largely represented. Mr. S. Utley, one of the speakers, said he believed that "if Sheffield was to maintain its position in the world, men and masters alike would have to bend themselves to the position, and that every one of them would be determined to bring out the best of material and skill in order to win back the position which he was afraid to a large extent they had lost. He complained of false stamping of goods, and said that such a practice was not honorable nor honest. Was it reasonable to suppose that dishonesty like that could live and prosper? If workmen and employers set themselves to the task of producing the best they could, they would be a long time before they would have to return to the present times. The men did not wish to be pauperized, but wanted a fair day's wages for an honest day's work, and they should never rest until they had completely ousted the abominable deception and dishonesty which existed among them."

Mr. Means, of Peru, Ill., whose works produce about one-sixth of all the zinc produced in the United States, read a statement before the Ways and Means Committee

on Monday in behalf of that industry. He said that he understood the bill placed zinc on the free list and to admit spelter at a reduction amounting to about 33 per cent. on the Silesian valuation. Against both propositions he desired earnestly to protest. He presented some interesting statistics comparing the wages paid to zinc-worker in Belgium and Silesia, the chief competing countries, with those paid in the works that he represents. The general average in Illinois is more than twice as high as in the two countries named. Not the least interesting fact brought out by these tables is that in Silesia, since Germany adopted the protective system, there has been a material advance in wages.

In response to an invitation from Honduras, the five Central Americas have held a four days' conference, and a settlement of all differences was approved by the plenipotentiaries, including those of Salvador and Nicaragua.

A petition of the Fall River Iron Works for an abatement of taxes on account of excessive valuation was decided by the country commissioners against the company, and the case is likely to be carried to the Supreme Court.

Mexico will export this year a large crop of tobacco which until now has borne the Cuban trade-marks.

It is probable that Congress will make the proposed tariff upon petroleum in Holland and the Dutch Colonies, in retaliation for the duty imposed by our tariff upon Sumatra tobacco, the subject of Legislative inquiry.

Henry F. Nickerson & Co., commission merchants in Boston, and agents for steamship lines to Savannah and Halifax, failed with liabilities at \$900,000, largely to local banks. The cause of the failure is said to be losses through claims and suits arising from the disaster to the steamship City of Columbus, of the Savannah Line, in the winter of 1884. More lately there were unfortunate purchases of sugar and hemp and unprofitable mining ventures.

The fruit growers of Solano County and other portions of California view the expulsion of the Chinese laborers with dismay. With white labor alone they will not be able to save their crops. The hop-growers of Mendocino County make similar complaints. They prefer white workmen if they can be found. The wages paid are said to range from \$30 to \$40 per month, with board.

The industrial development of Kansas since the census returns of 1880 is very satisfactory. The Kansas State Board of Agriculture in 1878 reported 679 manufacturing establishments in the State, having a joint capital of \$6,503,402. In 1882 the Board of Agriculture reported 644 manufacturing establishments, with a capital of \$7,258,106. The recent report of the Labor Bureau gives 900 establishments and \$19,000,000 invested, showing a very satisfactory increase in capital investment over the census returns. The value of the manufactured product of these 900 establishments is \$31,000,000; number of employees, 12,000; aggregate earnings of employees, \$4,000,000.

Two gas companies in Baltimore are supplying their customers with an illuminant at 50 cents per 1000 feet.

The British iron ship *Reliance*, now lying at Pier 9, East River, is in some respects the finest vessel of her class ever in this port. She has four masts, the main 195 feet above her decks. All the lower masts and yards are of iron. Her length is 340 feet over all; beam, 42½; depth, 24½, and she carries 2000 tons dead weight. Another notable vessel is the American four-masted schooner *Haroldine*, measuring 1291 tons, and square-rigged. She lately arrived with tea from Hong Kong, and is believed to be the only schooner in the China trade. As she requires only six men in the forecastle, she can be run profitably while an ordinary vessel could not.

A controversy between the engineers employed upon the new aqueduct results in the dismissal of Mr. Craven, engineer of construction, who is charged with insubordination.

A rating given a Cincinnati lumber merchant by a commercial agency was made the basis of a suit for \$10,000 on the ground that it misrepresented the plaintiff. The Superior Court has sustained the defense of the agency, which was that the plaintiff "refused to furnish information usually obtained from business men, and that the agency was therefore obliged to make an estimate from outside sources, which was done, it was claimed, without any malice."

Naval Officer Burt has sent a report to the Treasury Department concerning the recent decision of the United States Supreme Court prohibiting the collection of a duty on cartons or interior coverings used in connection with imports of merchandise. The decision required the return to importers of the duties unlawfully collected during the past three years. The report estimates that about \$5,000,000 will have to be refunded to the merchants of the country, of which \$4,000,000 will be payable to New Yorkers. Officials express the opinion that the estimate is subject to important reductions, through the failure of many importers who paid duties under protest to carry proceedings further by appeal and suit within the time limited for such steps to be taken.



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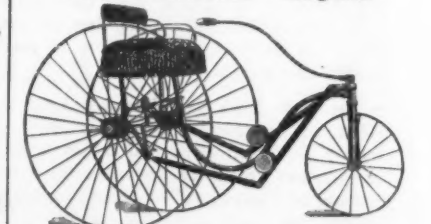
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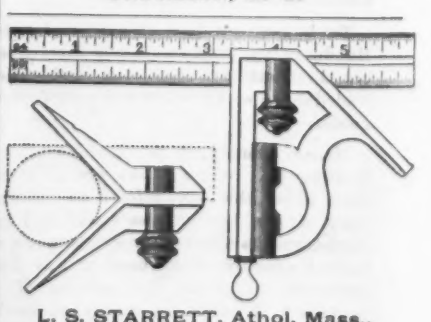
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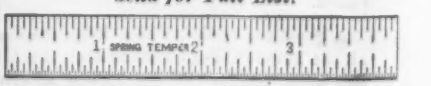
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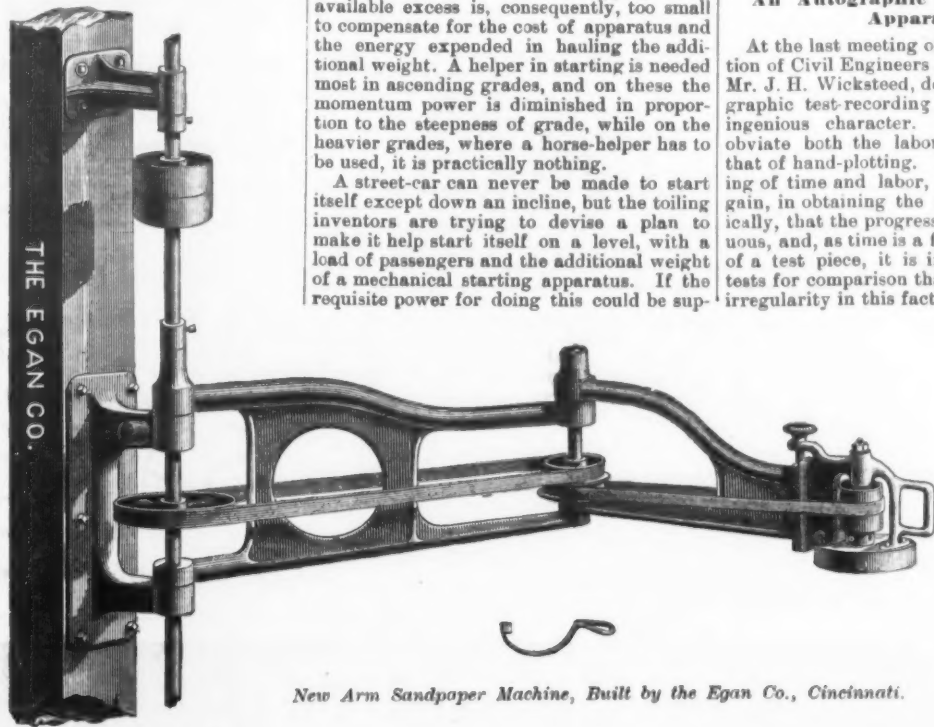
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## MECHANICAL.

## New Bracket Sander.

The sandpaper machine shown herewith is among the new tools recently brought out by the Egan Co., of Cincinnati. This device, it is claimed, is constructed in such a manner as to combine lightness and great strength, at the same time allowing all dust to be conveniently drawn away as fast as made. A special feature of the machine is the vertical adjustment of the disk, allowing a large variation of thickness in the stuff to be operated upon without necessitating an adjustment of the disk. When desired the machine is fitted to take in bits by removing the hand disk, in which form it serves as a boring machine of wide range. The frame is hollow and is cored throughout. The frame is so constructed that all the dust is drawn clear through it and either passed into the shaving box or a wet barrel, so as to avoid all annoyance. The hinge or swinging joint



New Arm Sandpaper Machine, Built by the Egan Co., Cincinnati.

in the middle is susceptible of any doubling or swinging required, and is ingeniously constructed without loose joints and without lost motion. It is so arranged that one side of the largest door can be sanded without moving it around on the bed of the machine. The disk or sandpaper head is very conveniently arranged. The sandpaper can be instantly changed by removing or loosening the screwed band or hoop. The head has a vertical adjustment regulated by the hand-wheel shown in the cut. The exhaust can be a small pipe attached to the main fan in the shop, or when desired a small fan made specially for the place is provided, which answers a very satisfactory purpose.

## Street-Car Starters.

The statement has been made that some 3500 patents have been issued in the United States for street car-starters. If this is so,

none the less, but all the more, fascinating to a large number of inventors who are eager to reap the rich harvest of success.

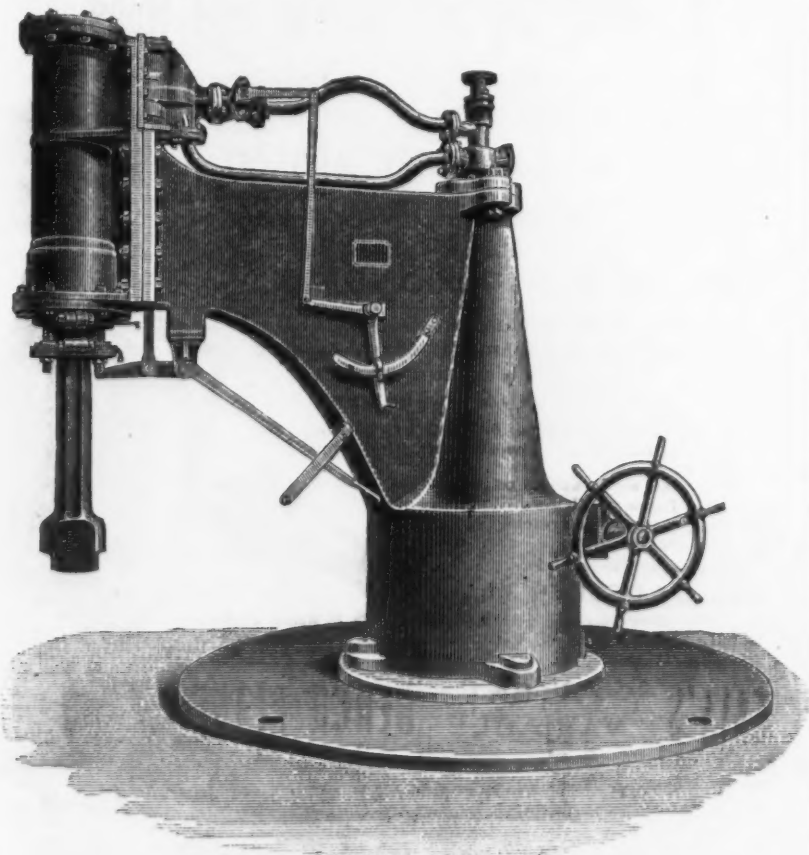
But, after all, is there not some delusion about it akin to that of perpetual motion? We are inclined to think there is. Indeed, we are quite sure of it, so far as storing up the momentum energy of the moving car is concerned and making it available for starting. It involves a question of compensation very much like that which is involved in lifting one's self by one's boot straps, or in making something out of nothing, only its absurdity is less apparent. The power expended in checking the momentum is something, to be sure, and it really seems as if this energy could be applied in winding up a spring or in compressing air into a cylinder, and that the power thus caught and harnessed could help start the car. And so it can be, but there is not enough of it. The game does not pay for the ammunition. The average street-car speed is too slow; the momentum energy is too little, and, besides, it is not all stored up, a large percentage of it being frittered away and lost in the slow stopping. The available excess is, consequently, too small to compensate for the cost of apparatus and the energy expended in hauling the additional weight. A helper in starting is needed most in ascending grades, and on these the momentum power is diminished in proportion to the steepness of grade, while on the heavier grades, where a horse-helper has to be used, it is practically nothing.

A street-car can never be made to start itself except down an incline, but the toiling inventors are trying to devise a plan to make it help start itself on a level, with a load of passengers and the additional weight of a mechanical starting apparatus. If the requisite power for doing this could be sup-

plied extraneously from the terminals or at points along the line, and the quantity needed could be boxed up, taken on board and used at every stop, it would be about the thing that is wanted, but the ways and means for doing this are yet to be discovered.

## A Radial Steam Hammer.

The accompanying engraving, reproduced from a recent issue of *Engineering*, shows an interesting form of steam hammer in the works of the Clyde Locomotive Co., of Glasgow, Scotland. It is a radial steam hammer of about 5 cwt., and was built by Messrs. Davis & Primrose, of Leith, Scotland. It will be noticed that the whole hammer, including the single overhanging standard, will turn on its axis, which is the center line of the standard, the steam and exhaust pipes coming in to this axis. The hammer



A Radial Steam Hammer, Built by Davis &amp; Primrose, Leith, Scotland.

says the *National Car and Locomotive Builder*, it is no wonder that the Patent Office has become a source of revenue and pays a surplus of several hundred thousand dollars every year into the Treasury. It is safe to say that any practical car-starting device will continue to be the one thing needful in street-car propulsion so long as horse-power holds its own against mechanical motors. Inventors have been wrestling fruitlessly with the problem for years, and, although the field still remains clear and is growing larger every day, very little has as yet been accomplished in the way of supplying the "long-felt want." To say that the problem is beset with difficulties makes it

is used for dabbings on the spoke ends of wheels, the work being done in dies and the hammer swinging round to cover the work, instead of that having to be shifted. A second anvil will be placed so that the hammer can be used for any ordinary work. The swiveling is effected by hand-wheel and worm gearing.

## Air Supply for Furnaces.

D. C. Clark, in his work upon the economy of fuel, says "that only two methods present themselves by which the supply of air and this want of the furnace can be made to correspond—either both must be made constant and regular or the fluctua-

tions of one must be made to coincide with those of the other," and he proposes to achieve the desideratum sought by an increased supply of air at the cooling by throwing open a sliding valve in the face of the door, which immediately commences closing slowly and automatically, and affords a greatly diminished supply of air to the furnace in harmony with the greatly diminished requirements of the fuel, the area-valve and the period of time throughout which the act of closing is to be prolonged being adjusted according to the nature of the coal and the average quantity supplied at one time. The outer furnace should be double, and the air should pass into the furnace through a series of perforations in the inner plate. By this arrangement three important points are secured. First, the heating of the heating of the air; second, its subdivision into minute jets, and, third, the keeping of the outer surface comparatively cool, and thereby both economizing heat and preventing its radiation outwardly to the attendants.

## An Autographic Test-Recording Apparatus.

At the last meeting of the British Institution of Civil Engineers a paper was read by Mr. J. H. Wicksteed, descriptive of an autographic test-recording apparatus of a very ingenious character. It is designed to obviate both the labor of observation and that of hand-plotting. But, besides the saving of time and labor, there is the further gain, in obtaining the diagrams autographically, that the progress of the test is continuous, and, as time is a factor in the behavior of a test piece, it is important in making tests for comparison that there should be no irregularity in this factor.

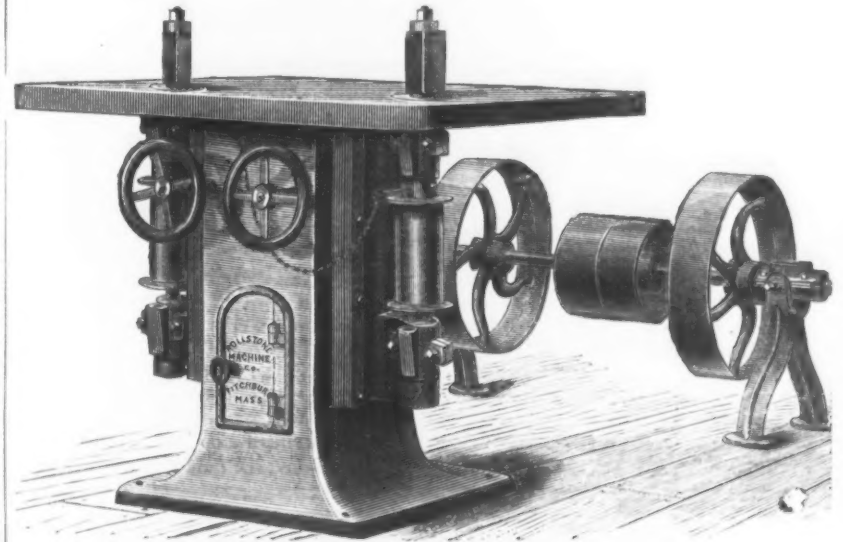
the sample, as it enables the local extension about the breaking point to be separated from the general, thus affording a means of comparing samples of different shapes; and, lastly, the apparatus makes its record quite independently of the manipulation of the poise upon the steelyard.

## An Emery File.

An ingenious device for stretching emery cloth for use in the workshop consists of a couple of strips of wood about 14 inches

drivers are 20 inches in diameter, with  $4\frac{1}{2}$ -inch face, and should make about 750 revolutions per minute.

The improved power mortiser is shown in Fig. 2. The frame is cast in one piece, strong and substantial, specially adapted for the various kinds of work such a machine would be called upon to do. The machine is provided with two beds or tables, one plain and one compound, the work being clamped by means of a hand-wheel, rack and pinion, thus bringing any part of the



New Wood-Working Machinery, Built by the Rollstone Machine Co., Fitchburg, Mass.—Fig. 1.—Double Spindle Shaping Machine.

long, hinged longitudinally, and of round, half-round, triangular or any other shape in cross-section. On the inside faces of the wood strips are pointed studs, taking into holes on the opposite sides. The strip of emery cloth is laid on to one set of the studs, and the "file," as it is called, closed, which fixes the strip on one side. It is then similarly fixed on the other side, and thus constitutes what is called an "emery file," and which is a handy and convenient arrangement for workshop use.

## New Wood-Working Machinery.

The Rollstone Machine Co., of Fitchburg, Mass., have just completed two new machines—a double spindle shaping machine and an improved mortiser—both of which are shown in the annexed cuts. The shaping machine, Fig. 1, is designed for molding and shaping straight and irregular forms for carriage, wagon, car and furniture manufacturers. The frame is cast in one piece, cored out, is heavy, substantial and well proportioned. The column is fitted with a

work under the chisel. The table can be set to any angle in case any work demands it, and can be lowered to take 15 inches under chisel by means of a hand-wheel and screw. The top shaft is  $1\frac{1}{8}$ -inch diameter, and has outside bearings, with drive pulley for chisel 10 inches in diameter, 2-inch face, and should make about 450 revolutions per minute; the drive pulley for boring-shaft is 12 inches diameter,  $4\frac{1}{2}$ -inch face. The boring attachment is fixed to the side of machine, and can be left off when not wanted. The machine is furnished with  $\frac{1}{4}$ -inch,  $\frac{3}{8}$ -inch,  $\frac{1}{2}$ -inch,  $\frac{5}{8}$ -inch,  $\frac{3}{4}$ -inch chisels, and, if boring attachment is furnished, bits to suit chisels.

## Belt Fastenings.

A correspondent of the *Woodworker* says about fastening a belt: "After quite a good experience with a great many ways of joining, I must say that above all others I prefer lapping and riveting, and I will give my reasons therefor. First, and above all other things, a riveted joint is the cheapest. I do not mean cemented and riveted, but lapped and riveted, taking care to skive nicely, so that the joint will not be clumsy, making the scarf according to the size of the belt. Do not scarf the ends down too thin; if you do the rivets will be likely to tear out. A little practice in this style of fastening a belt will make you do a nice job, and if you once get used to it I will warrant that you will never use any other method. It takes no more time, if as much, as it does to either lace or hook a belt with any device I have ever seen, and I have seen a great many. This style of fastening should be used all over the mill, whether driving belts or not."

## A Small High-Pressure Compound Engine.

A high-pressure compound engine on a small river steamer of 150 tons is thus described in *Engineering*: "The boat had a multi-tubular marine boiler 8 feet in diameter, 8 feet 6 inches long, containing two furnaces of 2 feet 6 inches in diameter 6 feet long, the combustion chamber being 1 foot 10 inches from the tube plate to back plate, and there being 72 tubes, outside diameter 3 inches. The engines had high-pressure cylinders 13.5 inches in diameter, with 16 inch stroke low pressure, 22 inches in diameter, boiler pressure 20 pounds, worked with the ordinary three-ported slide-valves, cutting the steam off from the cylinder at nine-sixteenths of stroke, the steam-pipe to high pressure engine 4 inches in diameter, exhaust high to low 5 inches in diameter, having no receiver, only a pipe. A gauge between the cylinders shows the pressure varied from 15 pounds to 30 pounds when the engine was working full speed. The low-pressure engine is worked with a five ported valve and cuts off at about three-quarters of the stroke. There is a large auxiliary valve about 2 inches in diameter of pipe to make sure of starting and reversing. The propeller is 6 feet in diameter, 6 feet 6 inches pitch, and with boiler pressure 80 pounds the engines make from 140 to 150 strokes per minute. The size of low-pressure exhaust to funnel is 5 inches, and the blast-pipe is 4 inches in diameter, and causes plenty of draft to keep steam."

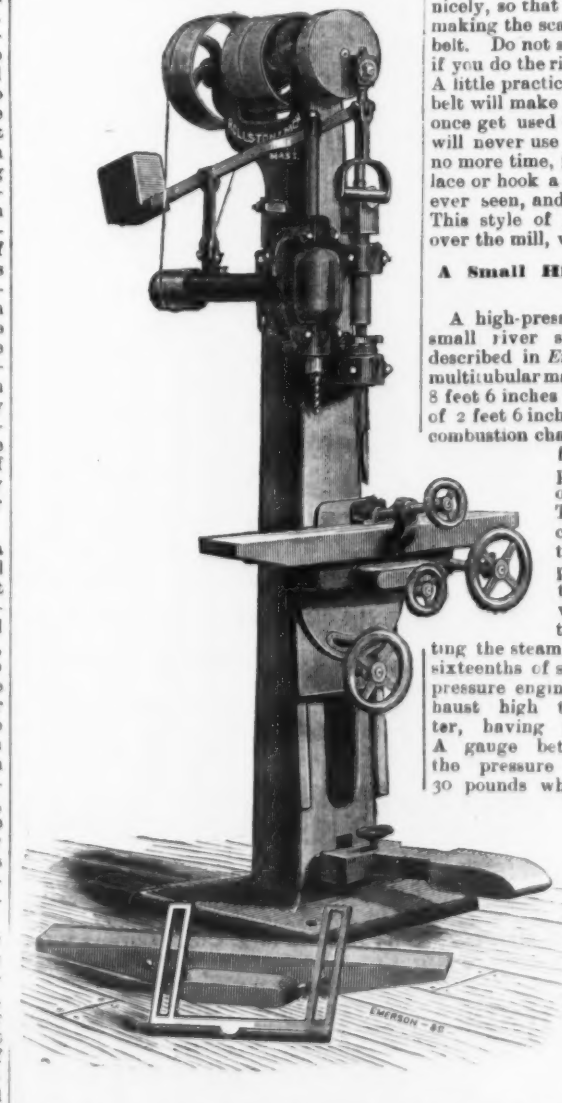


Fig. 2.—Improved Power Mortiser, Built by the Rollstone Machine Co., Fitchburg, Mass.

door, which makes a very handy place for tools, &c. The spindle-boxes are combined with the slides, being cast on, and the slides are planed and gibbed to the base, and are adjustable vertically by a hand-wheel in front of the machine. The steel spindles and pulleys are long and stiff, perfectly turned and balanced, and run in long bearings lined with babbitt. The table—either iron or wood, as wanted—is large, perfectly true, and fitted with concentric rings to suit various sizes and kinds of heads and cutters. The wood table, when preferred, is made of narrow strips of hardwood glued up so as to avoid all warping or getting out of true. The spindles will take cutters up to 4 inches long. The pulleys on the spindles are 4 inches in diameter, with 8-inch face. The tight and loose pulleys on the counter are 10 inches in diameter, with  $4\frac{1}{4}$ -inch face. The

## A Novelty in Grindstones and Emery-Wheels.

An improvement in grindstones and emery wheels noticed in a French paper is a modification by which the wheel is given a reciprocating lateral motion in addition to its rotation. Every one has noticed the advantage of moving a tool from side to side on a hand grindstone, so as to equalize the attraction on the different parts of the edge. It is found that by making the grindstone move, and keeping the tool still, a more perfect result is obtained, while the detached particles of steel have an opportunity to drop off the grindstone instead of



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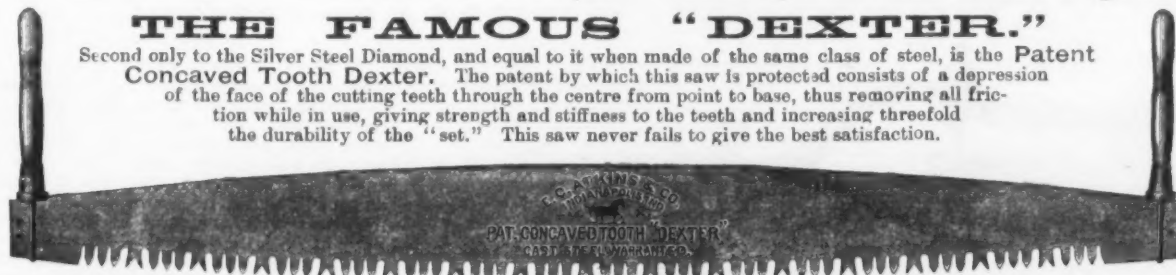
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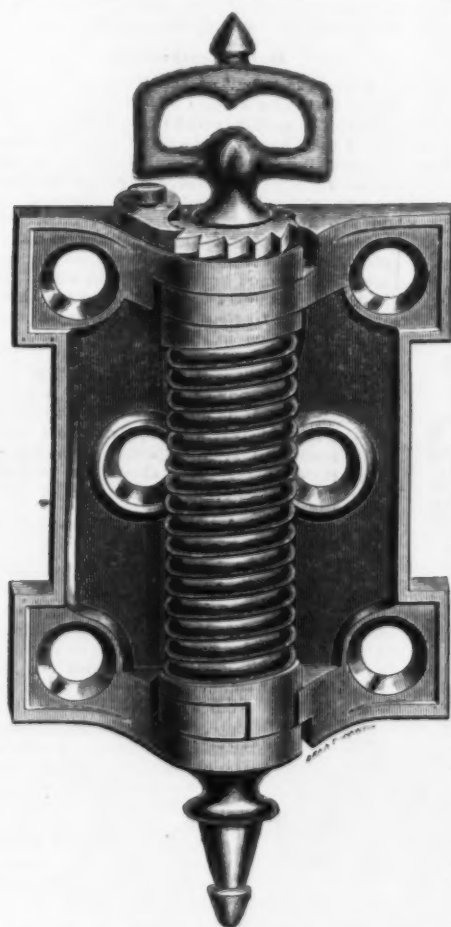
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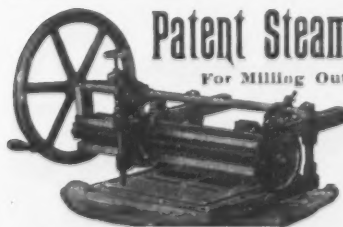
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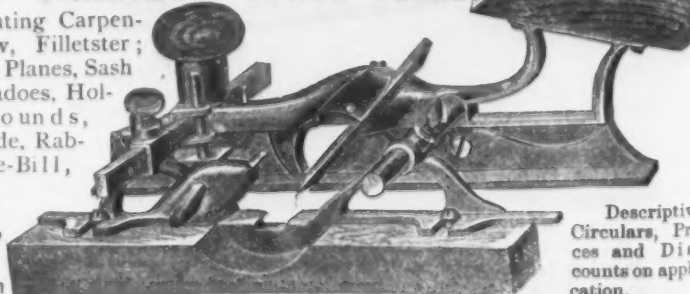
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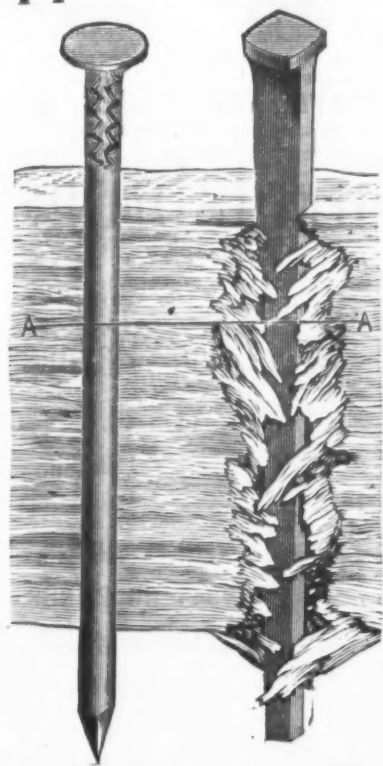
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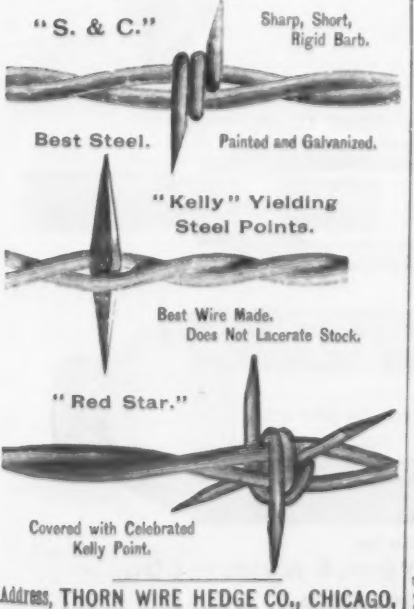
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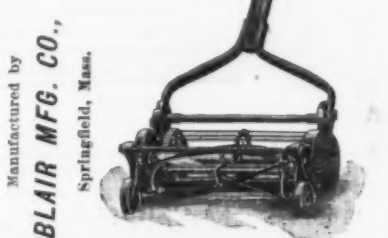
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Pulley Stands packed as required. Send for prices.

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Protects the Pistol from Perspiration. Prevents its rusting. Flexible and easy in the pocket.

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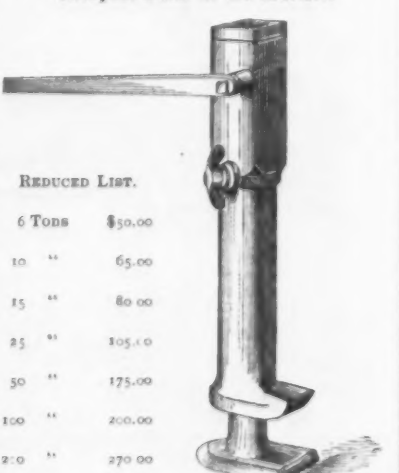
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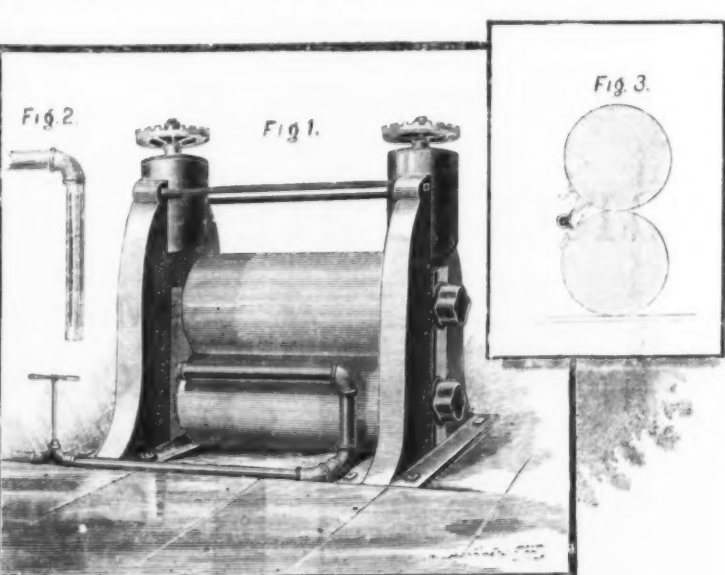
being crushed into it, and the wear of the stone and the heating of the tool are both greatly diminished.

## A Bad Place for Shafting.

In the reports of many mills, says the Western Manufacturers' Mutual Insurance Co., a point of great danger is indicated in the location of shafting beneath the floor in confined spaces that do not permit proper examination and oiling, and that favor accumulation of dust and rubbish. We have deemed it advisable in such cases, where alteration was difficult, to require automatic sprinklers, set 5 feet apart, above such shafts, and in all cases, where practicable, to ask an enlargement of the space sufficient to admit of easy examination, oiling and cleaning. It is desirable to call attention to this practice as both unsafe and unnecessary, as the defect continues to appear in new mills, in many cases designed by builders who should know the danger attending it. All shafting should be examined and cleaned daily, and lubricants supplied at proper intervals and in proper quantity, to insure safety and economy of power; any obstacle to this constitutes a serious hazard. Where shafting must be placed beneath the floor of a mill in a low basement or small confined space, it is best run in a brick-arched or cemented passage over a trench deep enough to give 5 or 6 feet vertically, and at least 4 feet wide, which is about as small a space as oilers and cleaners can safely work in; it is very rarely, if ever, that shafting is so located from necessity, it being rather an individual freak of the owner or builder, either ignorant or careless of possible consequences. Belting from above, where practicable, is safer and avoids needless openings through floors.

## The Altmeyer Roll Cooler for Sheet Mills.

Mr. Jacob Altmeyer, of Benwood, W. Va., has invented a simple contrivance for cooling the rolls of sheet mills, which we illustrate. As will be noted by examining Fig. 1, a pipe running parallel with the face of the rolls has openings adapted to discharge a stream of air upon their surface. A service-pipe connected with fan or blower is



THE ALTMAYER ROLL COOLER FOR SHEET MILLS.

provided to drive the air through the pipe, and a stop-cock to shut off or leave on the air, &c. Fig. 2 gives a view of the openings in pipe running parallel with the face of rolls, while Fig. 3 represents the air delivered upon the roll surfaces.

The blowing of air upon the roll surfaces reduces the heat which is imparted to the rolls by the heated iron, and gives the roller complete control over the rolls. As their temperature can be regulated they are kept in proper shape for work, and there is no loss of time on account of rolls rolling too hot or too full. The principal merit which is claimed for the roll cooler is that it equalizes the expansion and contraction of the rolls, thereby prolonging the life of them. Sheet mills having it in use make three full turns in 24 hours, thus enabling them to operate the machinery to its full productive capacity. There is a saving of iron both at cold rolls and in scrap from shears, and also some economy in grease for lubricating the neck.

## Waste of Power.

That coal bills in manufacturing establishments may often be readily reduced by attention to things outside of the boiler-room is evident from the following, which we find in the Boston Journal of Commerce:

With high-speed machinery and shafting driven at 300 turns per minute, it takes but a small resistance to waste a large amount of power. A load of only 10 pounds on a 3-foot wheel will call for 1 horse-power from the coal pile, and a light belt left dragging on the pulley will offer more than 10 pounds resistance. The Emerson power scales were recently applied to the pulley where the belt, when thrown off and hung up out of the way, would rest on a short arc on the driving-wheel, and it was found that this pulley required more power than was used on the machine it drove when the belt was in motion. Leather has a wonderful clinging tenacity, and wherever it is allowed to drag on the framework or guide bars, or in some of the belt-holes when the belt gets slack, more or less power will be absorbed, though the wear of the belt may not be noticeable. We have seen the set screw of a pulley slip and draw the shaft along in the bearing till one of the larger wheels rested against a floor beam, the rim cutting into the wood and the beam, making use of the friction break in absorbing power till the line of shafting was brought into place. Belts that have been overstretched by having more work to do than they are able to manage are not apt to run true on the pulley, and where the face of the wheels are no wider than the belt they must not run very close to the framework, as the projecting edges

of the belt may strike and offer a large amount of resistance. When there are indications of frictional resistance by the room becoming filled with the fumes of belt grease, there is a chance for some one besides the fireman to make a saving in coal, if it is nothing more than to remove the oiler's ladder that is grinding its way into the space between the fly-wheel and brick-work.

## State Boards of Arbitration for Labor.

The general disturbance of the conditions of labor renders important the steps to establish State boards to arbitrate differences between employers and employees. Such methods have been voluntarily adopted in several instances, the famous Brockton strike having been settled in this way. The Massachusetts Legislature has two bills before it providing for the appointment of a State board of arbitration. The one which meets the approval of the Knights of Labor arranges simply for the appointment by the Governor of a central commission of three men. To this board all disputed questions arising between capital and labor are to be referred. The pay is to be \$5 a day for each member, and traveling expenses, while on duty. The measure is a plain, practical one, and its operations are hampered by no useless machinery. The only objection made to it is the small pay, it being thought impossible to secure men of such intelligence and standing as ought to compose a central board for the small sum of \$5 a day.

The measure before the New York Legislature is more complex than the bill introduced in the Massachusetts Legislature. It seeks to accomplish the same object, but in a more roundabout way. A State board of arbitration is provided for, each of the three members of which is to receive a salary of \$3000. But, instead of being compelled to travel about the State and deal personally with each specific case of labor trouble, it is to act only when there is an appeal from the decision of local boards. The latter are to be appointed whenever and wherever desired, and are to consist of five members, who are to serve without pay. Neither the Massachusetts nor the New York measure, how-

## The Work of the Mahanoy Plane.

Mr. Guy C. Irish, of Mahanoy Plane, sends the Coal Trade Journal some interesting facts about this grand work:

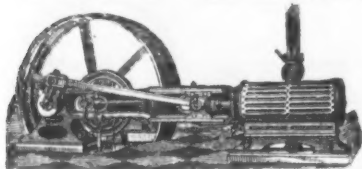
The Mahanoy Plane engine-house was erected in 1862, under the direction of Henry Jacobs, mason, and superintended by Geo. B. Roberts, who was the engineer and superintendent of the Mahanoy and Broad Mountain Railroad, then a leased line of the Philadelphia and Reading. It was 150 feet long by 50 feet wide, and built of hewn stone, with strong iron girders supporting the upper floor, over which the cars passed. The building originally contained the boilers that furnished the steam, 16 in number, but in 1867 a boiler-house was erected of the same dimensions as the engine-house, which contains seven nests of boilers (four to a nest) each 28 feet long and 36 inches diameter. The room formerly occupied by the boilers was then used to manufacture the pulleys and sheave blocks used in the plane. The engines were built by Geo. W. Snyder, Pottsville, in 1863, and were originally 500 horse-power, but of late years their capacity has been increased to 600 horse-power. James McCormick, a machinist in the employ of Mr. Snyder, who helped to build the engines, was the first engineer, and retained the position until 1871, when he became superintendent of the plane. The plane is 2480 feet long, and overcomes a vertical height of 360 feet. The rope used is a 2 1/4-inch steel wire, 2900 feet long, and its minimum capacity or life is 2,000,000 tons, although almost every one reaches 2,250,000 tons, and is then good for colliery work. The trips average seven cars, or 50 tons each; the average time hoisting is 2 1/2 minutes. In 1885 there was work done as follows:

Loaded cars hoisted.....	555,353 cars.
Empty cars lowered.....	562,353 cars.
Coal hoisted.....	2,135,948 tons.
Average hoist per hour worked.....	129.9 cars.
Cost per ton hoisted.....	1.78 cts.
Cost per car hoisted.....	10.70 cts.
Average number of tons per hour.....	780.98 tons.

The actual expenses for the year 1885, including wages of plane hands, repairs to machinery, coal and oils, repairs of track, cost of locomotives, &c., were \$38,022.28.



## THE CUMMER ENGINE

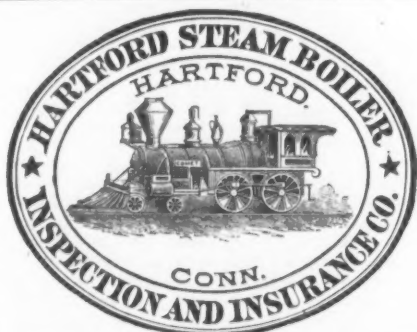


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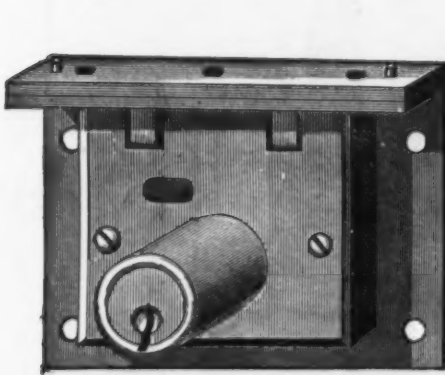
J. B. PIERCE, Sec.

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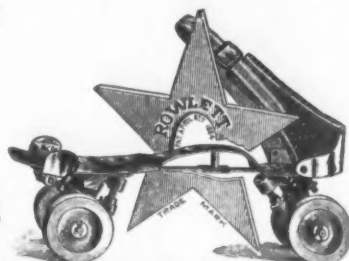
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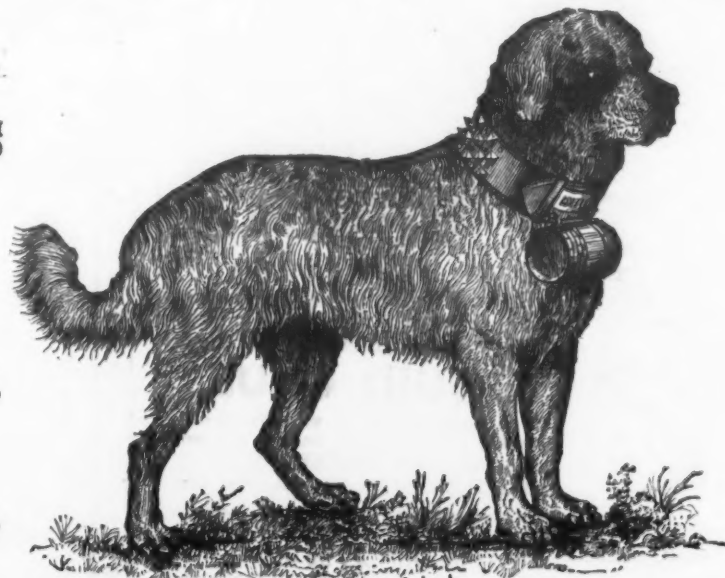
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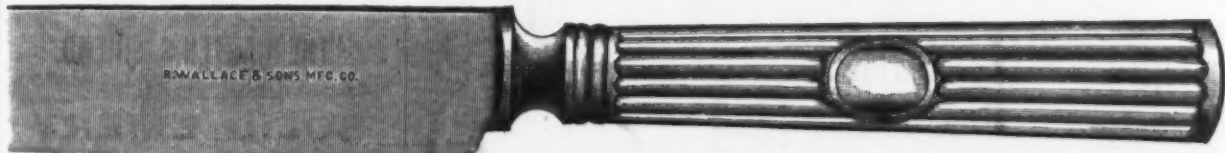
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All Kind of Goods Pertaining  
to the Dog.

We are the only firm in the world that make the manufacture of Dog Collars and Furnishings their exclusive business, and as such guarantee prices and goods. An illustrated catalogue containing full descriptions and prices of the goods mentioned above sent upon application.

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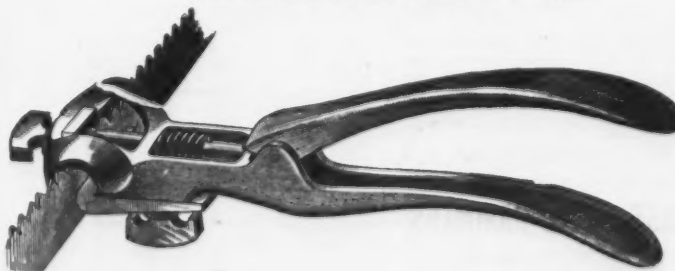
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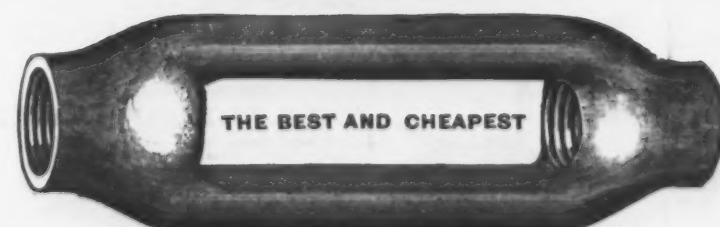
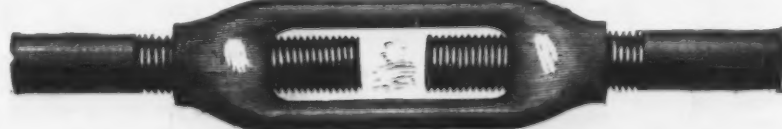
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Made by  
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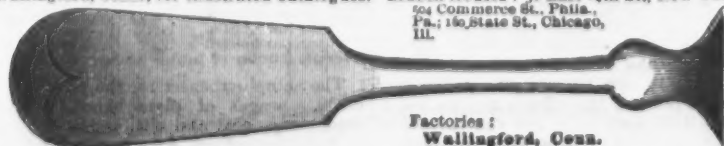
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If he aims to pipe well for  
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NIA, &c., to examine this  
no packing, but is always  
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**PANCOAST & MAULE,**  
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Send for a circular of this Union.  
If you happen to take an interest in doing  
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No. 11-A.)

THESE CARDS COVER the lines having a large variety of sizes or numbers, avoid marking each package or article, in Retail Stores, and are very convenient for use in Wholesale Sample Rooms. They secure correct and uniform selling prices, pay for themselves several times a year by saving time, and are intended for at least ten years' constant use. Hence, no Hardware Dealer can afford to do without them, or spend the time required to write and rule out something similar by hand. They are printed in very distinct type, on the best *Byron Weston's Ledger Paper*, appropriately ruled with blue ink cross-lines and red ink down rulings,

## DESCRIPTIONS AND PRICES.

Card No.	Size and Price Per Card.
1	A—BAR IRON, Weight of Round, Square and Flat, per Foot, and Tire per set. Western Classification and Prices of Extras on American, Norway and Swedes. 5½ x 18 in. 40c.
2	B—BAR STEEL, all Kinds and Sizes with Prices of Extras. Horse and Mule Shoes, Size, Weight, No. in Keg. Toe Chalks. Cut Nails, List of Extras. 40c.
3	A—CUT TACKS, Exact size cuts. Length. Number in a pound. B—LARGE HEAD CARPET TACKS. Gimp and Lace Tacks. Hungarian Nails, Hob Nails, Blued and Tinned, American and Swedes. Exact size cuts shown of all the above. 3 x 13½ in. 30c.
4	A—SHOE NAILS. Cigar Box Nails. Copper Tacks, Double-Pointed Tacks and Cuts. Glaziers' Points and Cuts. Barbed Blind Staples. 3 x 13½ in. 30c.
5	B—PATENT BRADS. Finishing Nails. Blued Clout Nails. Tinned Clout Nails. 30c.
6	A—IRON WOOD SCREWS. B—IRON WOOD SCREWS (continued). Iron Machine Screws. 6 x 18 in. 40c.
7	A—STANDARD CARRIAGE BOLTS. B—STANDARD CARRIAGE BOLTS (continued). Plow Bolts. 3 x 13½ in. 30c.
8	A—MACHINE BOLTS. B—STANDARD TIRE BOLTS. Round and Flat Head Stove Bolts. 3 x 13½ in. 30c.
9	A—PHILADELPHIA CARRIAGE BOLTS. B—PHILADELPHIA CARRIAGE AND TIRE BOLTS. 3 x 13½ in. 30c.
10	A—SQUARE AND HEXAGON NUTS. Wrought Washers. Size of Bolt, size of Hole, Width, Thickness, number in 100 pounds. B—COACH OR LAG SCREWS. Superior and Norway Axle Clips. 3 x 13½ in. 30c.
11	A—BRIGHT SCREW HOOKS. Belt Hooks. Blake's Belt Studs. B—BRIGHT SCREW EYES. Gate Hooks and Eyes. Cornice Hooks and Eyes. 3 x 13½ in. 30c.
12	A—PLATE CASTERS AND BED CASTERS. B—WROUGHT HOOKS AND STAPLES. Trap Door Rings. Hasps and Staples, and Staples only. 3 x 13½ in. 30c.
13	A—SAWS, Hand, Panel and Rip. Combination and Back. Disston's and W. M. & C.'s corresponding numbers and "Our Brand." B—SAWS, Back, Compass, Pruning, Kitchen, Butcher's Bow and Blades, Framed Wood Saws and Blades. 3 x 13½ in. 30c.
14	A—CHISELS. Slicks, Socket Framing, Socket and Tanged Firmer, Corner. B—Turning Chisels and Gouges, Socket and Tanged Firmer Gouges. 3 x 13½ in. 30c.
15	A—Cast Steel Augers and Bits. Boring Machine Augers. Jennings' Auger Bits. B—Bit Stock Drills. Gimlet Bits, German Pattern, Double Cut and Countersink. Center Bits. Clark's Expansive Bits. 3 x 13½ in. 30c.
16	A—HAMMERS. Ads Eye, Bell Face, Joiners', Steel Face and Claw, Riveting, Farriers', Blacksmiths', Machinists', Engineers'. B—HAMMERS. Tack, Masons', Sledges, Miscellaneous. Hatchets. Shingling, Lath, Half, Claw, Broad or Bench, Hunters'. 3 x 13½ in. 30c.
17	A—FILES. Pastard, Mill, Flat, Hand, Half-Round, Round, Square, Knife, Warding. Second Cut, Mill, Flat, Hand, Half-Round Smooth, Flat and Hand. B—FILES. Smooth, Half-Round, Round, Cabinet, Pit Saw, Hook Tooth, Gin Saw, Band Saw, Cant, Taper, Stubb's Taper. Rasp, Cabinet, Wood, Shoe, Horse. 7 x 15 in. 50c.
18	A—Rubber and Hump Packing. Gaskets or Rings. Rubber Hose. B—Leather and Rubber Belting. 3 x 13½ in. 30c.

## SAWS.

DISSTON'S NO. 3.		PANEL, HAND & RIP.		W. M. & C. NO. 12.	
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
22					
26					
28					

DISSTON'S NO. 7.		<b>PANEL, HAND &amp; RIP.</b>		W. M. & C. NO. 23.	
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
22					
26					
28					
30					

DISSTON'S NO. 8.		HAND AND RIP.			W. M. & C. NO. 26.
Length In.	List.	Cost.	Job.	Sell.	
26					
28					

DISSTON'S NO. D 8.		HAND AND RIP.			W. M. & C. NO. 27.
Length In.	List.	Cost.	Job.	Sell.	
26					
28					
30					

DISSTON'S NO. 12.		HAND AND RIP.		
Length In.	List.	Cost.	Job.	Sell.
26				
28				

## OUR BRAND.

PANEL, HAND AND RIP.				
Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
22				
26				
28				

## SPECIAL C. S. PANEL AND HAND.

Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
26				

## COMBINATION HAND.

Length In.	List.	Cost.	Job.	Sell.
26				

DISSTON'S NO. 1.		BACK.		W. M. & C. NO. 5.	
Length In.	List.	Cost.	Job.	Sell.	
10					
12					
14					
16					

for noting in pencil—List, Cost, Jobbing and Selling Prices—as in sample of Card 11—A, shown in the center of this page. Cards A and B of each number are mounted on each side of a tough, heavy card-board, especially adapted for this use, which is further protected on the four edges by being *cloth bound*. Two-thirds of them are 3 x 13½ inches. This size has been found convenient for hanging on a pilaster finish, or any other narrow surface, without hiding the goods. To hang or chain up each card there is firmly inserted through the top and center a nickel-plated eyelet about ⅜ inch inside diameter. They will be sent, *charges prepaid*, on receipt of price.

## DESCRIPTIONS AND PRICES.

Card No.	Size and Price Per Card.
17	A—WINDOW GLASS. List Prices and No. Lights per Box. Also ruled columns for other Wholesale and Retail rates. B—SASH, DOORS AND BLINDS. List Prices. 6 x 18½ in. 40c.
18	A—HINGES, Strap, Light and Heavy. T. Light, Heavy and Extra Heavy. Hinge Hasps, Screw Hook and Strap. B—SCREW HOOK AND EYE HINGES. Barn Door Hangers, Checked Back, Kidder's Anti-Friction, Wrought Frame. Barn Door Stay Rollers, Rail, Pulls, Latches. Sliding Door Rail. 3 x 13½ in. 30c.
19	A—WROUGHT BUTTS, Narrow, Loose Pin, Light Inside Blind. B—LOOSE PIN BUTTS, Plain, Japanned and Plated Tips. 3 x 13½ in. 30c.
20	A—LOOSE JOINT BUTTS, Plain, Japanned and Plated Tips. B—TABLE HINGES, Bronzed Iron Blind Butts. Brass Butts, Narrow, Middle, Broad and Desk. Width when open given of all. 3 x 13½ in. 30c.
21	A—DOOR BOLTS, Barrel, Square Spring, Foot, Chain. B—DOOR BOLTS, Flush, Neck and Miscellaneous kinds. 3 x 13½ in. 30c.
22	A—SCREW DRIVERS, Flat and Round Blade, Ratchet, Clark's. Screw Driver Bits. Countersinks, Reamers, Belt or Saddlers' Punches. B—RULES. WRENCHES. 3 x 13½ in. 30c.
23	A—HOOKS, Coat and Hat, Wardrobe, Schoolhouse, Harness, Clothes line. B—BELT BRACKETS. DRAWER PULLS. 3 x 13½ in. 30c.
24	A—WOOD PLANES, Plane Irons, Cut and Double. B—PATENT PLANES. Patent Plane Irons. 3 x 13½ in. 30c.
25	A—WOODENWARE AND BASKETS. Alphabetically arranged. B—WOODENWARE (continued). Alphabetically arranged. 7 x 22 in. 70c.
26	A—PICKED TINWARE. Alphabetically arranged. B—STAMPED TINWARE. Alphabetically arranged. 7 x 22 in. 70c.
27	A—JAPANNED TINWARE. Alphabetically arranged. B—GRANITE OR AGATE IRONWARE. Planished Ware, Stove and Hollow Ware. All Alphabetically arranged. 7 x 22 in. 70c.
28	A—MORTISE DOOR LOCKS, Latches, Knobs and Escutcheons. B—RIM DOOR LOCKS, Latches, &c. 7 x 22 in. 70c.
29	A—PADLOCKS, Japanned, Wrought Iron, Bronzed Iron, Brass and Jail. B—COMPLETE COMPARATIVE LIST OF CORRESPONDING NUMBERS OF PADLOCKS, Mallory, Wheeler Co., Wm. Wilcox Mfg. Co., Russell & Erwin Mfg. Co., Norwich Lock Mfg. Co., Nimick & Brittan Mfg. Co. Revised to July, 1885. 6½ x 22½ in. 70c.
30	A—CABINET LOCKS, Drawer, Chest, Cupboard and Trunk. Cabinet Keys. B—COMPLETE COMPARATIVE LIST OF CORRESPONDING NUMBERS OF CABINET LOCKS, Eagle, Corbin, Parker, Gaylord, Revised to July, 1885. 7 x 24 in. 70c.
31	A—Length and number of Nails to the pound. Number of feet in a bundle of Hoop, Scroll and Band Iron. Number of feet of Wire in a pound. Size of Cable Chain, weight per 100 feet and proof in tons. Bright Coil and Halter Chain and corresponding No. of wire. Bash weights and lin required for common sized windows. B—MISCELLANEOUS TABLES. Showing number Copper Rivets and Burs in a pound. Size of Skates compared with Shoes. Scale Beams, poise or weight needed for each. Brass Kettles, size, weight and capacity. Strap and T Hinges, weight and number packed in a barrel. Comparative Nos. of leading makers of Rules and Levels. Revised to July, 1885. Manila Rope, feet in a pound, weight of coils, breaking strain, &c. 6 x 22 in. 70c.
32	Is adapted for filling in with any line of goods. It is ruled both sides with columns headed respectively "Description," "Size or No.," "List," "Cost," "Job," "Sell." 4 x 14 in. 20c.

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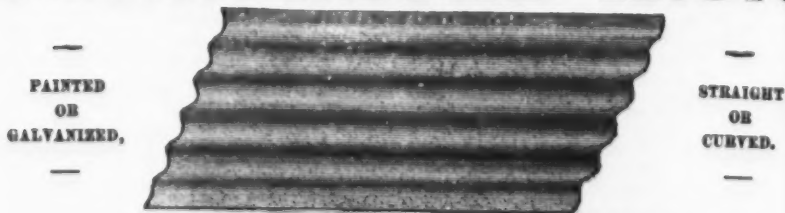
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SEE PAGE 3.

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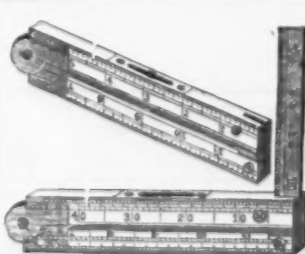
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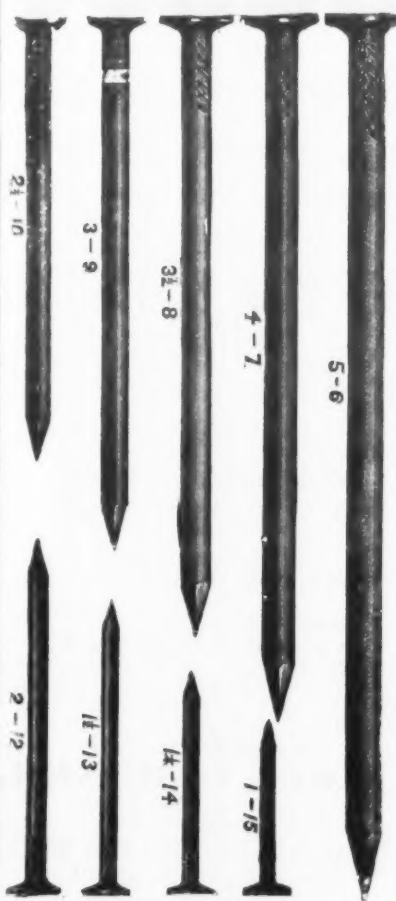
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Makers of Hoes, Forks, Rakes and Snaths,

JACKSON, MICH.

**OUR SHOE KNIVES**



are made from the *Best Cast Steel*, hardened and tempered by skilled workmen, and can be relied upon for possessing *Superior Cutting Qualities*.

We make the largest and most complete line of Shoe Knives ever offered to the Trade, including every description and style, and our prices are no higher than is asked for goods of inferior quality.

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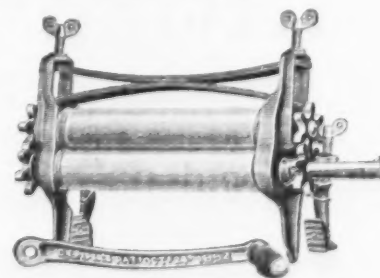
We also make a complete line of Table, Butcher, Sticking, Skinning, Steak, Cigar, Putty and other knives, including *CARVERS*. Illustrated Catalogue sent if applied for.

**GOODSELL COMPANY,**

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THE ALFORD & BERKELE CO., Agents, No. 77 Chambers St., New York, N. Y.

They are the Handsomest  
Wringers made,



and we offer them as a  
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We have recently greatly improved our Wringers and now offer a line of machines of a superior quality to any made. We have strengthened the frames where they required, and guarantee them to wring as dry and unconditionally to TURN EASIER than any wringer made. The frame is galvanized in the best manner, and the Shafts are of Steel. We use enameled handles on all our Wringers, which are not affected by alkali or water.

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Automatic Window Holder.

Cheapest, Strongest and Only Practical Automatic Lock and Holder on the Market.

SAMPLES FREE TO THE TRADE.

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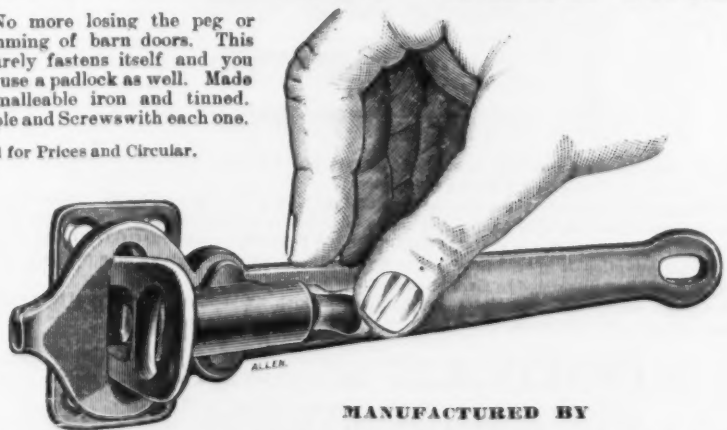


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**SOLD BY ALL HARDWARE DEALERS**  
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 The lightest running, best and cheapest Lawn Mower in the Market.  
 12, 14 and 16 inch cut.  
 Also Manufacturers of the Buckeye Hose Reel and Lawn Sprinkler, Buckeye Wrought Iron Fencing, Buckeye Force Pump, AND Iron Turbine Wind Engines.  
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No more losing the peg or slamming of barn doors. This securely fastens itself and you can use a padlock as well. Made of malleable iron and tinned. Staple and Screws with each one.  
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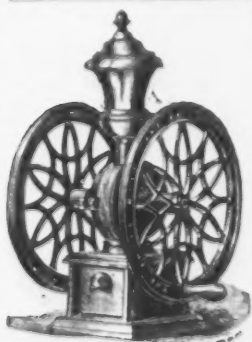


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**SWEET & CLARK MFG. COMP'Y, TROY, N. Y.**  
**BRUSH ELECTRIC LIGHT.**  
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Write for Catalogue No. 15 to  
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 The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 20 styles.

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Will roast 20 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers,  
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Send for Illustrated Catalogue with sizes, weights and prices of 100 different kinds of Presses and Tools for Cans, Tinware, Silver and Brass Goods, Locks, Hardware and other Iron Goods. A new line of Punching Presses just out.

### B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.  
 ESTABLISHED 1845.  
 Office, foot of Houston Street, East River, NEW YORK.

**NEWTON & CO.,**  
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 MANUFACTURERS OF BEST QUALITY

**FIRE BRICK**  
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Edge Pressed Furnace Blocks,  
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 Twenty years' practical experience.

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 Tiles, Blast Furnace Blocks, &c., and in a Special Department Linings for Stoves, Ranges and Boilers of superior quality. Miners of and dealers in Wood-bridge, N. J., Fire Clay and Fire Sand and Staten Island Kaolin.

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**JAMES GARDNER,**  
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All dimensions of Firebricks and Shapes,  
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Orders by Car or Boat Loads promptly filled.  
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**Self-Binders for The Iron Age.**



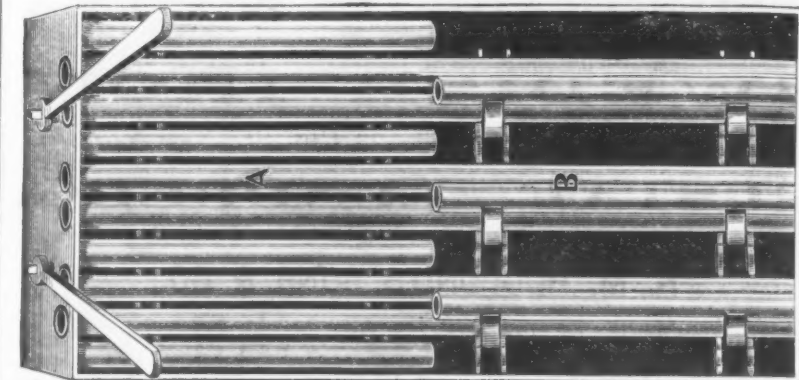
**PRICES.**  
 Full Cloth, \$1.25  
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We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to

**DAVID WILLIAMS,**

66 and 68 Duane Street, New York.

### VICTORY AT LAST —IN— LOCOMOTIVE GRATES.



The above cut shows Grate shut in section A, and open in section B. The Levers shown in cut extend up into the Cab of Engine, and the remarkable fact remains that the Grate can be cleaned while running at the highest rate of speed, and be kept perfectly clear of clinkers. The Long Bars in Grate are Water Bars, the Short ones Rocking Bars. Both being hollow, as a natural consequence cannot be warped or burned. We claim a saving in fuel of 35% not considering the great saving on the Flues and Engine proper. This Grate can be used with or without Water Bars on Locomotives, likewise on Stationary Engines, Furnaces and Ranges of all kinds, and is now in preferable use on the Lehigh Valley R. R., and unreservedly endorsed by them. This Grate will pay for itself in 30 days, and last for years. It is the only grate that will burn with equal success Hard or Soft Coal or Cumin. We desire live men in every State, to form syndicates all over the United States. Full information will be furnished by applying to

**THE AMERICAN WATER BAR GRATE CO.,**

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Send for endorsements of Locomotive Engineers.

### MOORE MANUF'G CO.,

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**CHICAGO,**

Manufacturers of

**"NOVELTY"**  
**Tackle Blocks,**

Wrought Iron Hooks, Malleable  
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Four sizes now ready with single, double or  
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The Finest Blocks in the Market  
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### AMERICAN CUTLERY CO.,

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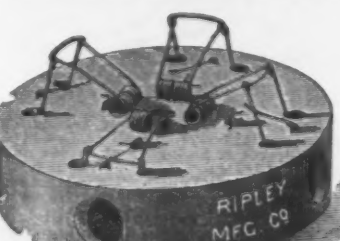
### Hyde's Improved Mitre Box.

SIMPLE, ACCURATE, DURABLE

and a low-priced Mitre Box. It is provided with a Back S. and warranted perfect in every respect. It will cut a molding 4 in. deep 4 in. wide. Attention is called to the stop-gauge for sawing tenons, which is set by a single thumb-screw, the saw-guide holding the saw parallel with the base at all times.

PRICES:  
 20-in. Saw ..... \$5.75.  
 22-in. " ..... 6.00.

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**"COMMON SENSE" MOUSE TRAP.**  
**BEST IN MARKET.**

**For Home & Export Trade.**

**RIPLEY MFG. CO.,**

Unionville, Ct., U. S. A.,

Manufacturers of

Porcelain-Lined Lemon Squeezers, Mallets, Rose-

wood Faucets, Patent Boot Jacks and Hard-

ware. Fine Wood Turning a Specialty.

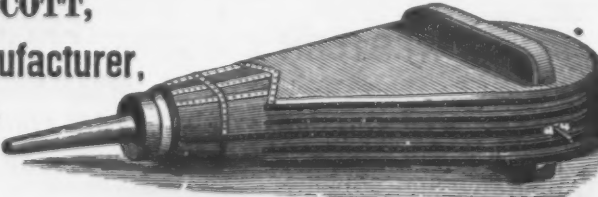
**GEO. M. SCOTT,**

**Bellows Manufacturer,**

Johnson Street,

Cor. 224 St.,

**CHICAGO, ILL.**





[illegible]

Flat Head Iron	dis	83 1/2 %
Flat Head Brass	dis	84 1/2 %
Round Head Iron	dis	84 1/2 %
Round Head Brass	dis	85 1/2 %
<b>Spools.</b>		
German Silver	dis	50 1/2 10 1/2 4 %
Britannia, Boardman's	dis	40 1/2 10 1/2 50 %
German Silver	dis	50 1/2 10 1/2 4 %
Tinned	dis	10 1/2 %
<b>Spring.</b> —Torrey		
Coil No. 2 medium Japanese	\$5.00	dis 50 %
Coil No. 2 medium Japanese	2.75	dis 50 1/2 %
Coil No. 10 w gross net		\$5.50 60 60 %
Coil No. 10 w gross net		dis 50 1/2 10 1/2 4 %
Warner Door Springs, 7 doz.	\$2.50	dis 40 1/2 %
Standard Spring Hinge—		
Single No. 1 w doz. net		\$1.10 125 %
Single No. 1 w doz. net		1.35 150 %
Other Standard Spring Hinges		dis 25 1/2 10 1/2 40 %
<b>Stove Polish.</b> —Gem	w gross	\$4.50, dis 12 1/2 %
Dixon		6.00, dis 10 %
No. 25 1/2—Spirital		dis 10 1/2 %
<b>Tacks.</b>		Combination discounts
Shoe Nails—4's, and over, 5's &c		dis 10 %
Double Pointed Tacks		dis 8 1/2 %
<b>Traps.</b>		
Genuine Oneta—Newhouse		dis 35 %
Im. Oneta—Newhouse list	First qual. dis	60 1/2 10 1/2 %
<b>Vises.</b> —Solid Box. Trenton new list.	dis	60 1/2 10 1/2 40 %
No. 25 1/2—Spirital		dis 75 1/2 10 1/2 40 %
Coe's Genuine		dis 60 1/2 3 %
Coe's Mechanics		dis 60 1/2 10 1/2 3 %
Coe's Mechanics, Mail Bar.		dis 80 1/2 80 1/2 3 %
<b>Wire.</b>		
Bright or Annealed, No. 0 to 18.		dis 65 1/2 %
Bright or Annealed, No. 18 to 36.		dis 70 %
Bright or Annealed, No. 27 to 36.		dis 70 %
Coppered, 0 to 18.		dis 90 %
Coppered, 18 to 36.		dis 90 %
Galvanized Barb Wire.		dis 65 %
Painted Barb Wire.		dis 45 %
Galvanized, No. 7 to 18.	Market List	dis 50 %
<b>Wringers.</b>		
Peerless No. 24.		\$10.00
Peerless No. 24.		35.00
Universal No. 24.		35.00
Universal No. 2.		dozen lots
Novelty No. 3.	for common tubs	30.00
Novelty No. 3.		4 00 40 %
Excelsior E.	for stationary tubs	39.00

TERMS.—Note or acceptance at 90 days, with current rate of exchange on New York, or a discount of 2 1/2 per cent. for cash, if remitted within 10 days from date of invoice.

**For fluctuations and discounts on card rates for Foreign Exchange.** *Burgh Trade Report.*

The following are card rates:

<b>Flat Bar.</b>	
14 to 4 by 1/4 to 1 inch.....	2.06
14 to 6 by 1/4 to 1 inch.....	2.16
14 to 6 by 1/4 to 1 1/2 ".....	2.26
14 to 6 by 1/4 to 1 3/4 ".....	2.36
14 to 6 by 1/4 to 2 ".....	2.46
1 1/2 and 1 3/4 by 1/4 to 1 1/2 ".....	2.16
1 1/2 and 1 3/4 by 1/4 to 1 3/4 ".....	2.26
1 1/2 and 1 3/4 by 1/4 to 2 ".....	2.36
1 1/2 and 1 3/4 by 1/4 to 2 1/2 ".....	2.46
<b>Rounds and Squares.</b>	
1 to 1 1/2 by 1/4 to 1 1/2 ".....	2.26
1 to 1 1/2 by 1/4 to 1 3/4 ".....	2.36
1 to 1 1/2 by 1/4 to 2 ".....	2.46
1 to 1 1/2 by 1/4 to 2 1/2 ".....	2.56
1 1/2 to 2 by 1/4 to 1 1/2 ".....	2.66
1 1/2 to 2 by 1/4 to 1 3/4 ".....	2.76
1 1/2 to 2 by 1/4 to 2 ".....	2.86
1 1/2 to 2 by 1/4 to 2 1/2 ".....	2.96
2 to 2 1/2 by 1/4 to 1 1/2 ".....	3.06
2 to 2 1/2 by 1/4 to 1 3/4 ".....	3.16
2 to 2 1/2 by 1/4 to 2 ".....	3.26
2 to 2 1/2 by 1/4 to 2 1/2 ".....	3.36
<b>Half Round and Half Square.</b>	
1 1/2 to 2 by 1/4 to 1 1/2 ".....	2.86
1 1/2 to 2 by 1/4 to 1 3/4 ".....	2.96
1 1/2 to 2 by 1/4 to 2 ".....	3.06
1 1/2 to 2 by 1/4 to 2 1/2 ".....	3.16
<b>Horse Shoe.</b>	
1/4 to 1 1/4 by 5-16 to 1/2 inch.....	3.06

"	"	11 and 12.	3.36
"	"	12 and 14.	3.36
"	"	11 and 12.	3.06
<i>Heavy Bands.</i>			
134 to 6	by 4	5 and 10 inch.	2.26
134 to 3	by 4	5 and 5 1/2 "	2.26
134 to 1	by 4	5 and 5 1/2 "	2.26
4 to 3	by 4	5 and 10 "	2.56
4 to 3	by 4	5 and 5 1/2 "	3.06
<i>Light Bands.</i>			
134 to 6	by 4	to 3-10.	2.26
134 to 6	by Nos. 11 and 12.		2.56
134 to 3	by 4	to 3-10.	2.26
1 to 134	by Nos. 11 and 12		2.76
4 and 13-16	by 4	to 3-10.	2.96
4 and 13-16	by Nos. 11 and 12.		3.06
4 and 11-16	by 4	to 3-10.	3.26
4 and 13-16	by Nos. 11 and 12		3.26
4 and 9-16	by 4	to 3-10.	3.56
4 and 9-16	by Nos. 11 and 12.		3.56
inch by 4	to 3-10 and 12		3.56
inch by Nos. 11 and 12			3.96
<i>Drop Iron.</i>			
134 to 4.	Nos. 13, 14 and 15.		2.84
134 to 2.	Nos. 16, 17 and 18.		2.84
134 to 2.	Nos. 19, 20 and 21.		3.06
134 to 2.	Nos. 20, 20.		3.06
134 to 2.	Nos. 21.		3.26
134 to 2.	Nos. 22.		3.26
15-16, 1 and 14.	Nos. 13, 14 and 15.		3.06
15-16, 1 and 14.	Nos. 16, 17 and 18.		3.16
15-16, 1 and 14.	Nos. 19, 20 and 21.		3.36

9-6	Nos. 19 and 20.	3.46
9-6	No. 21.	3.56
9-6	No. 22.	3.56
9-6	Nos. 13, 14 and 15.	3.56
9-6	Nos. 16, 17 and 18.	3.56
9-6	Nos. 19 and 20.	3.56
9-6	No. 21.	3.76
9-6	No. 22.	3.86
9-6	Nos. 13, 14 and 15.	3.86
9-6	Nos. 16, 17 and 18.	3.86
9-6	Nos. 19 and 20.	3.76
9-6	No. 21.	3.86
9-6	No. 22.	3.86
11-6	Nos. 13, 14 and 15.	3.76
11-6	Nos. 16, 17 and 18.	2.86
11-6	Nos. 19 and 20.	2.86
11-6	No. 21.	4.06
11-6	No. 22.	4.16
9-6	Nos. 13, 14 and 15.	3.66
9-6	Nos. 16, 17 and 18.	4.06
9-6	Nos. 19 and 20.	4.16
9-6	No. 21.	4.16
9-6	No. 22.	4.36
9-6	No. 23.	4.46
9-6	Nos. 13, 14 and 15.	4.16
9-6	Nos. 16, 17 and 18.	4.26
9-6	Nos. 19 and 20.	4.36
9-6	No. 21.	4.46
9-6	No. 22.	4.56
9-6	No. 23.	4.66
9-6	Nos. 13, 14 and 15.	4.66
9-6	Nos. 16, 17 and 18.	4.46
9-6	Nos. 19 and 20.	4.66
9-6	No. 21.	4.86
9-6	No. 22.	4.86

lighter than the lightest indicated.	
1.10¢ per lb extra will be charged for cutting Hoops to specified length.	
<b>Barrel Hoops.</b>	
9 to 11 ft. 1/4 in. to 2 in. cut to length.	3.00
10 ft. and less than 9 ft. 6 hoops.	3.14
8 ft. and less than 7 ft. 6 hoops.	3.28
<b>Extras for Cutting to Length all Preceding Iron.</b>	
All Iron, including Tank.	1.10¢
<b>Tank Iron.</b>	
No. 9 and heavier	2.84
Flow Slabs	3.34
Flow Wings	3.34
<b>Sheet Iron.</b>	
	Common. Charcoal. Junila.
No. 10 to 14	3.00 6.46
No. 15 to 17	3.34 6.46
No. 18 to 21	3.68 6.64
No. 22 to 24	4.02 6.64
No. 25 to 27	4.36 6.64
No. 27	4.70 7.00
No. 28	5.04 7.28
No. 29	5.38 7.64
All sheet iron, lighter, over 30 inches wide, not less than 2.10¢ extra.	
<b>Wood's Patent Flashed Sheet.</b>	
1st quality 30 in. 2d quality 30 in.	94
36 galvanized 30 in. Charcoal Hammered Blooms.	

Coal Screen Iron.			
14 by 5 1/2 by 8 in.	2.54	14 by 5 1/2 by 8 in.	3.04
24, 3, 3 1/2 and 4 inch.	2.84		
14 by 5 1/2 and 2 1/2	2.94		
1 1/2 by 1 1/2	3.14		
1 1/2 by 1 1/2 inch, for Plow Handles	3.14		
1 1/2 by 3/4	3.34		
1 1/2 by 3/4	3.34		
<i>T. Rail.</i>		<i>T. Rail.</i>	
8 lbs. to the yard.	2.44	20 lbs. to the yard.	2.54
10 " " " "	2.64	24 " " " "	2.64
12 " " " "	2.84	30 " " " "	2.84
12 " " " "	2.84	36 " " " "	3.04
12 " " " "	3.04	42 " " " "	3.24
12 " " " "	3.24	48 " " " "	3.44
12 " " " "	3.44	54 " " " "	3.64
12 " " " "	3.64	60 " " " "	3.84
12 " " " "	3.84	66 " " " "	4.04
12 " " " "	4.04	72 " " " "	4.24
12 " " " "	4.24	78 " " " "	4.44
12 " " " "	4.44	84 " " " "	4.64
12 " " " "	4.64	90 " " " "	4.84
12 " " " "	4.84	96 " " " "	5.04
12 " " " "	5.04	102 " " " "	5.24
12 " " " "	5.24	108 " " " "	5.44
12 " " " "	5.44	114 " " " "	5.64
12 " " " "	5.64	120 " " " "	5.84
12 " " " "	5.84	126 " " " "	6.04
12 " " " "	6.04	132 " " " "	6.24
12 " " " "	6.24	138 " " " "	6.44
12 " " " "	6.44	144 " " " "	6.64
12 " " " "	6.64	150 " " " "	6.84
12 " " " "	6.84	156 " " " "	7.04
12 " " " "	7.04	162 " " " "	7.24
12 " " " "	7.24	168 " " " "	7.44
12 " " " "	7.44	174 " " " "	7.64
12 " " " "	7.64	180 " " " "	7.84
12 " " " "	7.84	186 " " " "	8.04
12 " " " "	8.04	192 " " " "	8.24
12 " " " "	8.24	198 " " " "	8.44
12 " " " "	8.44	204 " " " "	8.64
12 " " " "	8.64	210 " " " "	8.84
12 " " " "	8.84	216 " " " "	9.04
12 " " " "	9.04	222 " " " "	9.24
12 " " " "	9.24	228 " " " "	9.44
12 " " " "	9.44	234 " " " "	9.64
12 " " " "	9.64	240 " " " "	9.84
12 " " " "	9.84	246 " " " "	10.04
12 " " " "	10.04	252 " " " "	10.24
12 " " " "	10.24	258 " " " "	10.44
12 " " " "	10.44	264 " " " "	10.64
12 " " " "	10.64	270 " " " "	10.84
12 " " " "	10.84	276 " " " "	11.04
12 " " " "	11.04	282 " " " "	11.24
12 " " " "	11.24	288 " " " "	11.44
12 " " " "	11.44	294 " " " "	11.64
12 " " " "	11.64	300 " " " "	11.84
12 " " " "	11.84	306 " " " "	12.04
12 " " " "	12.04	312 " " " "	12.24
12 " " " "	12.24	318 " " " "	12.44
12 " " " "	12.44	324 " " " "	12.64
12 " " " "	12.64	330 " " " "	12.84
12 " " " "	12.84	336 " " " "	13.04
12 " " " "	13.04	342 " " " "	13.24
12 " " " "	13.24	348 " " " "	13.44
12 " " " "	13.44	354 " " " "	13.64
12 " " " "	13.64	360 " " " "	13.84
12 " " " "	13.84	366 " " " "	14.04
12 " " " "	14.04	372 " " " "	14.24
12 " " " "	14.24	378 " " " "	14.44
12 " " " "	14.44	384 " " " "	14.64
12 " " " "	14.64	390 " " " "	14.84
12 " " " "	14.84	396 " " " "	15.04
12 " " " "	15.04	402 " " " "	15.24
12 " " " "	15.24	408 " " " "	15.44
12 " " " "	15.44	414 " " " "	15.64
12 " " " "	15.64	420 " " " "	15.84
12 " " " "	15.84	426 " " " "	16.04
12 " " " "	16.04	432 " " " "	16.24
12 " " " "	16.24	438 " " " "	16.44
12 " " " "	16.44	444 " " " "	16.64

[illegible]

Comotive Tank Steel.	41
File Cast Steel.	
Square, Round, Half Round and Flat Bustard, 8	41
inch and over.	
Mill Saw, 8 inch and over.	5
Taper, 30 inch and over.	6
Horse and Shoe Rasp.	41
Spring Cast Steel.	41
Spiral, Taper, cut to lengths.	5
Tire Cast Steel.	
12-16 and over.	6
13-16, 17-23 and 5-32.	41
15-16 1/2 and 5-32, 16-23 and 5-32.	41
24-30 and 15-16.	41
Tool Safe Cast Steel.	100
Three and Five Ply Cast Steel.	5
Agricultural Implements Cast Steel.	
Fork and Rake Steel.	41
Fork and Rake Steel, cut to length.	41
Hoe, Crutch.	41
Shovel, Crutch.	41
Shovel, Hoe and Shovel, Crutch, in Bars.	41
Crutch and Hoe in Slabs.	41
Besemer and Open Hearth.	
Spring.	2-10
Spiral and Spiral Taper cut to lengths.	39
Tire, 2-16 thick and above.	41

Drain Shoe cut to lengths and tapered	10
Drain Valve	10
Drain Drill Bar	10
Drain Drill Points	10
Rolling Coal Tank, cut and punched	30
Fraser Steel	10
Thermal Term.	10
Roll of Hammer Bille.	10
Term.	10
Term. — Four months — 3 per cent. discount for cash	10
remitted within 30 days.	10
<b>Rolls and Castings.</b>	10
Furnace Floor and strengthening Plates	10
Housings and Castings not otherwise specified	10
Grating Plates	10
Grinding and Abrasive	10
Grinding Rolls and Pins, large size	10
Grinding Rolls and Pins, small size	10
Pipe Mill Castings	10
Rolling Mill Castings under 50 lb.	10
Spur and Bevel Wheels, large	10
Spur and Bevel Wheels, small	10
Rollers up to 30 inches	10
Rollers over 30 inches	10
Engine Castings, light	10
Engine Castings, heavy	10
<b>White and Red Lead.</b>	10
Strictly Pure White Lead in Oil, in Kegs 64 lb. or over	10
Do. less than 64 lb. in Kegs 32 lb. or over	10
Do. less than 32 lb. in Kegs 16 lb. or over	10
Do. less than 16 lb. in Kegs 8 lb. or over	10
Do. less than 8 lb. in Kegs 4 lb. or over	10
Do. less than 4 lb. in Kegs 2 lb. or over	10
Do. less than 2 lb. in Kegs 1 lb. or over	10
Do. less than 1 lb. in Kegs 1/2 lb. or over	10
Do. less than 1/2 lb. in Kegs 1/4 lb. or over	10
Do. less than 1/4 lb. in Kegs 1/8 lb. or over	10
Do. less than 1/8 lb. in Kegs 1/16 lb. or over	10
Do. less than 1/16 lb. in Kegs 1/32 lb. or over	10
Do. less than 1/32 lb. in Kegs 1/64 lb. or over	10
Do. less than 1/64 lb. in Kegs 1/128 lb. or over	10
Do. less than 1/128 lb. in Kegs 1/256 lb. or over	10
Do. less than 1/256 lb. in Kegs 1/512 lb. or over	10
Do. less than 1/512 lb. in Kegs 1/1024 lb. or over	10
Do. less than 1/1024 lb. in Kegs 1/2048 lb. or over	10
Do. less than 1/2048 lb. in Kegs 1/4096 lb. or over	10
Do. less than 1/4096 lb. in Kegs 1/8192 lb. or over	10
Do. less than 1/8192 lb. in Kegs 1/16384 lb. or over	10
Do. less than 1/16384 lb. in Kegs 1/32768 lb. or over	10
Do. less than 1/32768 lb. in Kegs 1/65536 lb. or over	10
Do. less than 1/65536 lb. in Kegs 1/131072 lb. or over	10
Do. less than 1/131072 lb. in Kegs 1/262144 lb. or over	10
Do. less than 1/262144 lb. in Kegs 1/524288 lb. or over	10
Do. less than 1/524288 lb. in Kegs 1/1048576 lb. or over	10
Do. less than 1/1048576 lb. in Kegs 1/2097152 lb. or over	10
Do. less than 1/2097152 lb. in Kegs 1/4194304 lb. or over	10
Do. less than 1/4194304 lb. in Kegs 1/8388608 lb. or over	10
Do. less than 1/8388608 lb. in Kegs 1/16777216 lb. or over	10
Do. less than 1/16777216 lb. in Kegs 1/33554432 lb. or over	10
Do. less than 1/33554432 lb. in Kegs 1/67108864 lb. or over	10
Do. less than 1/67108864 lb. in Kegs 1/134217728 lb. or over	10
Do. less than 1/134217728 lb. in Kegs 1/268435456 lb. or over	10
Do. less than 1/268435456 lb. in Kegs 1/536870912 lb. or over	10
Do. less than 1/536870912 lb. in Kegs 1/1073741824 lb. or over	10
Do. less than 1/1073741824 lb. in Kegs 1/2147483648 lb. or over	10
Do. less than 1/2147483648 lb. in Kegs 1/4294967296 lb. or over	10
Do. less than 1/4294967296 lb. in Kegs 1/8589934592 lb. or over	10
Do. less than 1/8589934592 lb. in Kegs 1/17179869184 lb. or over	10
Do. less than 1/17179869184 lb. in Kegs 1/34359738368 lb. or over	10
Do. less than 1/34359738368 lb. in Kegs 1/68719476736 lb. or over	10
Do. less than 1/68719476736 lb. in Kegs 1/137438953472 lb. or over	10
Do. less than 1/137438953472 lb. in Kegs 1/274877906944 lb. or over	10
Do. less than 1/274877906944 lb. in Kegs 1/549755813888 lb. or over	10
Do. less than 1/549755813888 lb. in Kegs 1/1099511627776 lb. or over	10
Do. less than 1/1099511627776 lb. in Kegs 1/2199023255552 lb. or over	10
Do. less than 1/2199023255552 lb. in Kegs 1/4398046511104 lb. or over	10
Do. less than 1/4398046511104 lb. in Kegs 1/8796093022208 lb. or over	10
Do. less than 1/8796093022208 lb. in Kegs 1/17592186044416 lb. or over	10
Do. less than 1/17592186044416 lb. in Kegs 1/35184372088832 lb. or over	10
Do. less than 1/35184372088832 lb. in Kegs 1/70368744177664 lb. or over	10
Do. less than 1/70368744177664 lb. in Kegs 1/140737488355328 lb. or over	10
Do. less than 1/140737488355328 lb. in Kegs 1/281474976710656 lb. or over	10
Do. less than 1/281474976710656 lb. in Kegs 1/562949953421312 lb. or over	10
Do. less than 1/562949953421312 lb. in Kegs 1/1125899906842624 lb. or over	10
Do. less than 1/1125899906842624 lb. in Kegs 1/2251799813685248 lb. or over	10
Do. less than 1/2251799813685248 lb. in Kegs 1/4503599627370496 lb. or over	10
Do. less than 1/4503599627370496 lb. in Kegs 1/9007199254740992 lb. or over	10
Do. less than 1/9007199254740992 lb. in Kegs 1/18014398509481984 lb. or over	

United States	Sizes.	A.	A.	B.	C.
8 1/2	6 x 6 to 10 x 15.....	10.75	8.50	7.50	7.00
10	11 x 14 to 15 x 24.....	9.25	8.00	8.00	7.25
14	18 x 24 to 24 x 30.....	12.75	8.75	8.75	7.75
20	30 x 24 to 24 x 30.....	12.25	10.75	9.00	8.00
24	36 x 24 to 24 x 30.....	13.00	11.50	9.75	8.75
30	42 x 24 to 24 x 30.....	14.50	13.25	10.75	9.75
36	48 x 24 to 24 x 30.....	15.00	14.00	11.25	10.25
42	54 x 24 to 24 x 30.....	.....	.....	.....	.....
48	60 x 24 to 24 x 30.....	.....	.....	.....	.....
54	66 x 24 to 24 x 30.....	.....	.....	.....	.....
60	72 x 24 to 24 x 30.....	.....	.....	.....	.....
66	78 x 24 to 24 x 30.....	.....	.....	.....	.....
72	84 x 24 to 24 x 30.....	.....	.....	.....	.....
78	90 x 24 to 24 x 30.....	.....	.....	.....	.....
84	96 x 24 to 24 x 30.....	.....	.....	.....	.....
90	102 x 24 to 24 x 30.....	.....	.....	.....	.....
96	108 x 24 to 24 x 30.....	.....	.....	.....	.....
102	114 x 24 to 24 x 30.....	.....	.....	.....	.....
108	120 x 24 to 24 x 30.....	.....	.....	.....	.....
114	126 x 24 to 24 x 30.....	.....	.....	.....	.....
120	132 x 24 to 24 x 30.....	.....	.....	.....	.....
126	138 x 24 to 24 x 30.....	.....	.....	.....	.....
132	144 x 24 to 24 x 30.....	.....	.....	.....	.....
138	150 x 24 to 24 x 30.....	.....	.....	.....	.....
144	156 x 24 to 24 x 30.....	.....	.....	.....	.....
150	162 x 24 to 24 x 30.....	.....	.....	.....	.....
156	168 x 24 to 24 x 30.....	.....	.....	.....	.....
162	174 x 24 to 24 x 30.....	.....	.....	.....	.....
168	180 x 24 to 24 x 30.....	.....	.....	.....	.....
174	186 x 24 to 24 x 30.....	.....	.....	.....	.....
180	192 x 24 to 24 x 30.....	.....	.....	.....	.....
186	198 x 24 to 24 x 30.....	.....	.....	.....	.....
192	204 x 24 to 24 x 30.....	.....	.....	.....	.....
198	210 x 24 to 24 x 30.....	.....	.....	.....	.....
204	216 x 24 to 24 x 30.....	.....	.....	.....	.....
210	222 x 24 to 24 x 30.....	.....	.....	.....	.....
216	228 x 24 to 24 x 30.....	.....	.....	.....	.....
222	234 x 24 to 24 x 30.....	.....	.....	.....	.....
228	240 x 24 to 24 x 30.....	.....	.....	.....	.....
234	246 x 24 to 24 x 30.....	.....	.....	.....	.....
240	252 x 24 to 24 x 30.....	.....	.....	.....	.....
246	258 x 24 to 24 x 30.....	.....	.....	.....	.....
252	264 x 24 to 24 x 30.....	.....	.....	.....	.....
258	270 x 24 to 24 x 30.....	.....	.....	.....	.....
264	276 x 24 to 24 x 30.....	.....	.....	.....	.....
270	282 x 24 to 24 x 30.....	.....	.....	.....	.....
276	288 x 24 to 24 x 30.....	.....	.....	.....	.....
282	294 x 24 to 24 x 30.....	.....	.....	.....	.....
288	300 x 24 to 24 x 30.....	.....	.....	.....	.....
294	306 x 24 to 24 x 30.....	.....	.....	.....	.....
300	312 x 24 to 24 x 30.....	.....	.....	.....	.....
306	318 x 24 to 24 x 30.....	.....	.....	.....	.....
312	324 x 24 to 24 x 30.....	.....	.....	.....	.....
318	330 x 24 to 24 x 30.....	.....	.....	.....	.....
324	336 x 24 to 24 x 30.....	.....	.....	.....	.....
330	342 x 24 to 24 x 30.....	.....	.....	.....	.....
336	348 x 24 to 24 x 30.....	.....	.....	.....	.....
342	354 x 24 to 24 x 30.....	.....	.....	.....	.....
348	360 x 24 to 24 x 30.....	.....	.....	.....	.....
354	366 x 24 to 24 x 30.....	.....	.....	.....	.....
3					

30 X 50	50 X 50	50 X 54	
30 X 50	50 X 54	50 X 56	50 X 58
30 X 50	50 X 56	50 X 58	50 X 60
30 X 50	50 X 58	50 X 60	50 X 62
30 X 50	50 X 60	50 X 62	50 X 64
30 X 50	50 X 62	50 X 64	50 X 66
30 X 50	50 X 64	50 X 66	50 X 68
30 X 50	50 X 66	50 X 68	50 X 70
30 X 50	50 X 70	50 X 72	50 X 74
30 X 50	50 X 74	50 X 76	50 X 78
30 X 50	50 X 78	50 X 80	50 X 82
30 X 50	50 X 82	50 X 84	50 X 86
30 X 50	50 X 86	50 X 88	50 X 90
30 X 50	50 X 90	50 X 92	50 X 94
30 X 50	50 X 94	50 X 96	50 X 98
30 X 50	50 X 98	50 X 100	50 X 102
30 X 50	50 X 102	50 X 104	50 X 106
30 X 50	50 X 106	50 X 108	50 X 110
30 X 50	50 X 110	50 X 112	50 X 114
30 X 50	50 X 114	50 X 116	50 X 118
30 X 50	50 X 118	50 X 120	50 X 122
30 X 50	50 X 122	50 X 124	50 X 126
30 X 50	50 X 126	50 X 128	50 X 130
30 X 50	50 X 130	50 X 132	50 X 134
30 X 50	50 X 134	50 X 136	50 X 138
30 X 50	50 X 138	50 X 140	50 X 142
30 X 50	50 X 142	50 X 144	50 X 146
30 X 50	50 X 146	50 X 148	50 X 150
30 X 50	50 X 150	50 X 152	50 X 154
30 X 50	50 X 154	50 X 156	50 X 158
30 X 50	50 X 158	50 X 160	50 X 162
30 X 50	50 X 162	50 X 164	50 X 166
30 X 50	50 X 166	50 X 168	50 X 170
30 X 50	50 X 170	50 X 172	50 X 174
30 X 50	50 X 174	50 X 176	50 X 178
30 X 50	50 X 178	50 X 180	50 X 182
30 X 50	50 X 182	50 X 184	50 X 186
30 X 50	50 X 186	50 X 188	50 X 190
30 X 50	50 X 190	50 X 192	50 X 194
30 X 50	50 X 194	50 X 196	50 X 198
30 X 50	50 X 198	50 X 200	50 X 202
30 X 50	50 X 202	50 X 204	50 X 206
30 X 50	50 X 206	50 X 208	50 X 210
30 X 50	50 X 210	50 X 212	50 X 214
30 X 50	50 X 214	50 X 216	50 X 218
30 X 50	50 X 218	50 X 220	50 X 222
30 X 50	50 X 222	50 X 224	50 X 226
30 X 50	50 X 226	50 X 228	50 X 230
30 X 50	50 X 230	50 X 232	50 X 234
30 X 50	50 X 234	50 X 236	50 X 238
30 X 50	50 X 238	50 X 240	50 X 242
30 X 50	50 X 242	50 X 244	50 X 246
30 X 50	50 X 246	50 X 248	50 X 250
30 X 50	50 X 250	50 X 252	50 X 254
30 X 50	50 X 254	50 X 256	50 X 258
30 X 50	50 X 258	50 X 260	50 X 262
30 X 50	50 X 262	50 X 264	50 X 266
30 X 50	50 X 266	50 X 268	50 X 270
30 X 50	50 X 270	50 X 272	50 X 274
30 X 50	50 X 274	50 X 276	50 X 278
30 X 50	50 X 278	50 X 280	50 X 282
30 X 50	50 X 282	50 X 284	50 X 286
30 X 50	50 X 286	50 X 288	50 X 290
30 X 50	50 X 290	50 X 292	50 X 294
30 X 50	50 X 294	50 X 296	50 X 298
30 X 50	50 X 298	50 X 300	50 X 302
30 X 50	50 X 302	50 X 304	50 X 306
30 X 50	50 X 306	50 X 308	50 X 310
30 X 50	50 X 310	50 X 312	50 X 314
30 X 50	50 X 314	50 X 316	50 X 318
30 X 50	50 X 318	50 X 320	50 X 322
30 X 50	50 X 3		

spades, list... dia 2047  
dia 2047 76

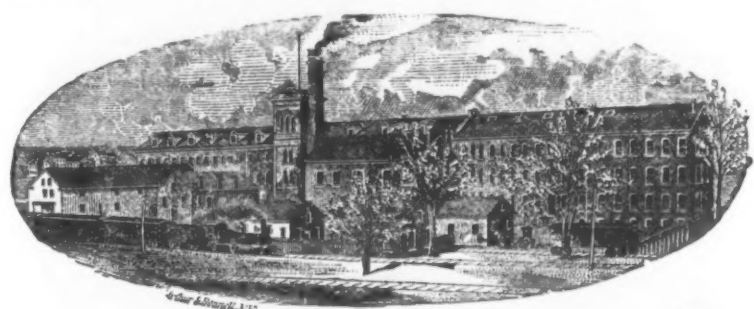
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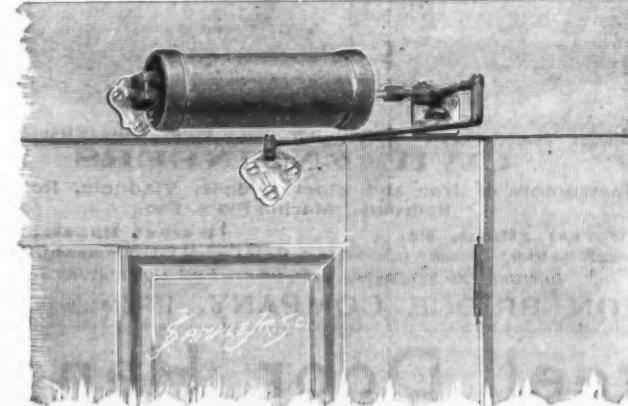
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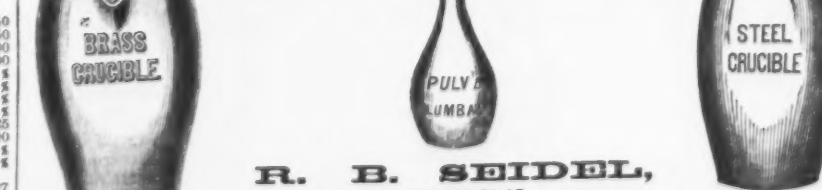
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For Net Bottom Prices see Page Adv. Iron Age, FEB. 11th.

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FOR NET BOTTOM PRICES SEE PAGE AD.  
IN IRON AGE, FEB. 11th.

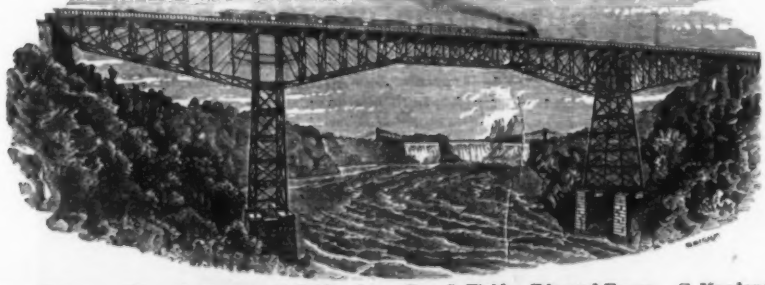
No. 210, Ornamental Iron, Iron Knob, fine finish, Etirusan Bronze..... \$0.50  
No. 211, Ornamental Iron, Iron Knob, fine finish, Olympian Bronze..... .75  
No. 212, Ornamental Iron, Iron Knob, fine finish, Pompeii Bronze..... .85  
No. 213, Ornamental Iron, Iron Knob, Nickel-plated..... 1.25  
No. 214, Ornamental Iron, Iron Knob, Nickel-plated, Rich Old Gold Inlaid..... 1.40  
No. 215, Ornamental Iron, Iron Knob, Nickel-plated, Pale Old Gold Inlaid..... 1.60  
No. 216, Ornamental Iron, Iron Knob, Nickel-plated, Fire Old Gold Inlaid..... 1.75

No. 21, Ornamental Iron, Iron Knob, Nickel-plated, Crimson Old Gold Inlaid..... 1.85  
No. 218, Ornamental Iron, Iron Knob, Nickel-plated, Blue Old Gold Inlaid..... 1.90  
No. 219, Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold Inlaid..... 1.95  
No. 220, Ornamental Iron, Iron Knob, Nickel-plated, Copper Old Gold Inlaid..... 2.05  
No. 221, Ornamental Iron, Iron Knob, Nickel-plated, Lemon Old Gold Inlaid..... 2.05  
No. 222, Ornamental Cast Brass, Polished and Lacquered..... 2.65  
No. 223, Ornamental Cast Brass, Nickel-plated..... 3.60

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Anti-friction Steel Barn Door Hangers.  
Three sizes of Steel Common Hangers.  
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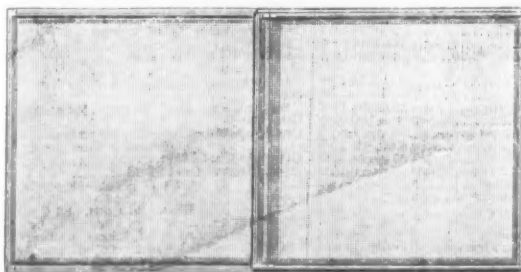
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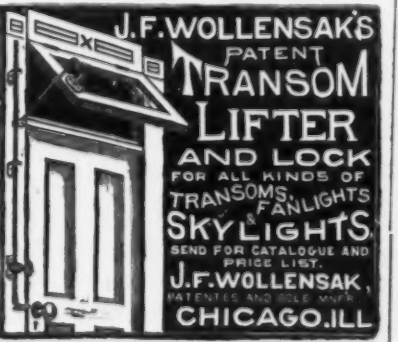


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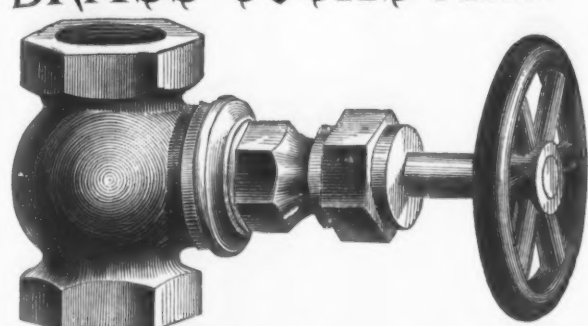
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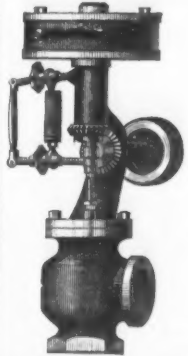
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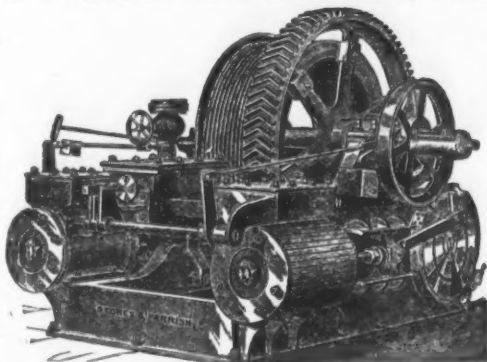
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Manufacturers of Nail and Spike Machines, Bolts  
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Office and Works: Railroad St., near 28th, Pittsburgh, Pa.



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HOISTING  
MACHINERY

For Mines, Dock  
Use and Inclined  
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All kinds of  
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With Vertical or Horizontal Cylinders for Handling Stock to Top of Stack  
with One or Two Platforms.

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## Presses and Dies and Special Machinery

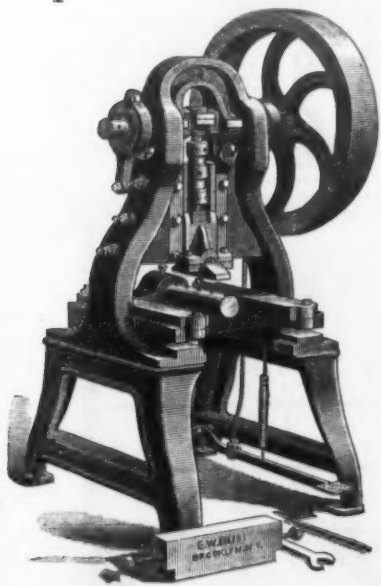
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DOUBLE  
SEAMING MACHINES

FOR  
Round, Square and Oval Cans.

HAND AND POWER  
Circular Shears.

Foot and Power  
Squaring Shears.



WORKS:  
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OFFICE:  
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## THE STOCK, WORKMANSHIP, DESIGN AND FINISH

IN  
THESE  
TOOLS  
ARE  
SUPERIOR  
TO ALL  
OTHERS,



## AND WE SO WARRANT THEM.

WE ALSO MAKE A SPECIALTY OF  
TOOLS, FIXTURES AND GAUGES  
For Manufacturing INTERCHANGEABLE Work, Such As  
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GEO. B. TURRELL, Pres., 75 Chambers St., New York. DUNCAN K. MAJOR, Treas., Torrington, Conn.

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ESTABLISHED 1864.

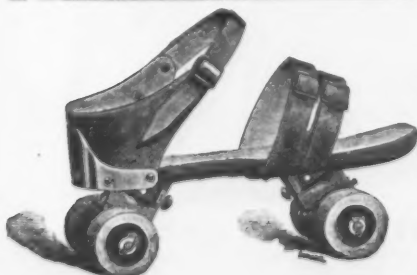
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OUR LATEST STYLE  
**CLUB SKATES**  
For Hink and Private Use,  
BOTH FOR LADIES AND  
GENTLEMEN



Manufacturers of Ice and Roller Skates and Specialties in Hardware. Wood Turners, and Electro-platers  
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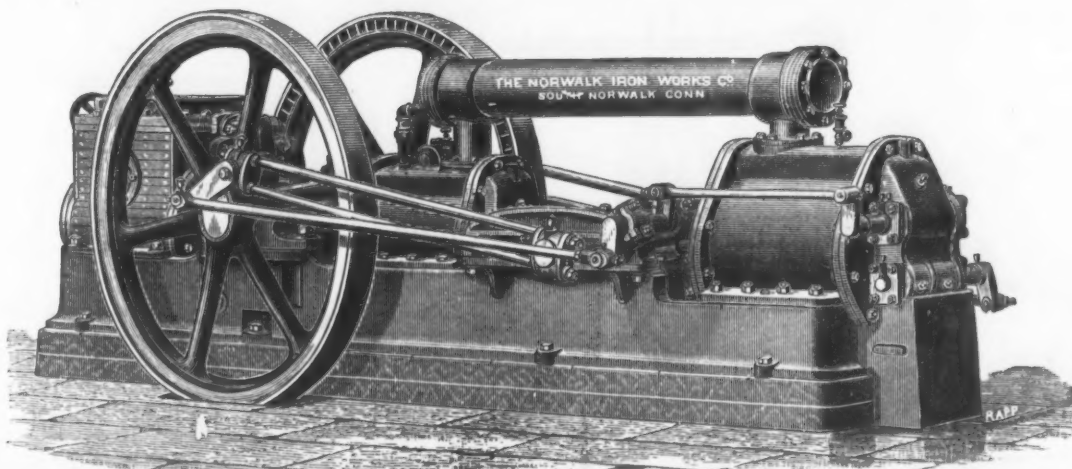
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BEST IN THE WORLD.

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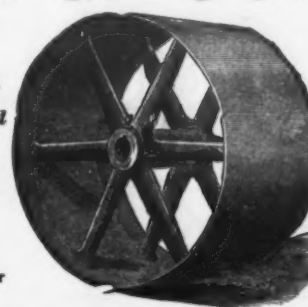
## THE NORWALK IRON WORKS CO., South Norwalk, Conn.

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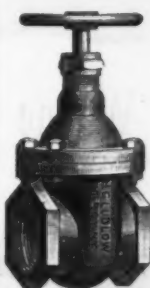
SHAFTING,  
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Pulley Castings and  
Machine-Molded  
GEARING  
A SPECIALTY.  
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Estimates furnished. Write for  
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Established in 1874.  
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24 and 26 West Street, Cleveland, O.  
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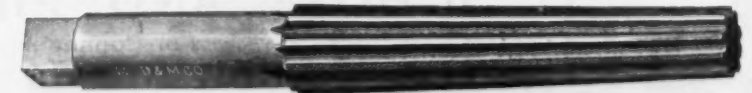
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ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

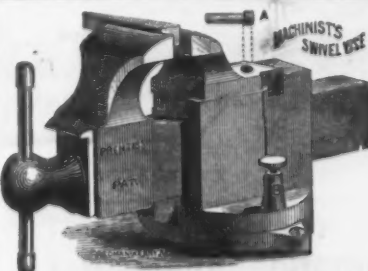
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Manufacture of Patent Machine Relieved Nut, Hand,  
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ADJUSTABLE JAW,

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FITS ANY VISE. SOLD BY THE TRADE.

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SOLE PROPRIETORS. SEND FOR CIRCULAR.

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CHEAPEST  
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UPWARDS.

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MADE IN FOUR SIZES,  
10, 15, 20 and 30 ton capacity, to lift 10 or 18  
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SUPERIOR TO ANY JACK NOW MADE.  
Absolute in its actions in any position.  
Under control, etc. and instantaneous control.

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Machinery, &c.

Hydrostatic Machinery,

JACKS, PRESSES, PUNCHES, ACCUMULATORS, PUMPS, VALVES, FITTINGS, &c.

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Successors to CLEM & MORSE,

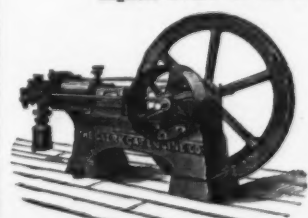
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No Boiler, Coal, Ashes or Engineer. Made in Sizes of 4, 8, 10, 15 and 25 H.P.

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The Steadiest-running Gas Engine yet Made.

ENGINES AND PUMPS COMBINED For Hydraulic Elevators, Town Water Supply, or Railway Service.

SPECIAL ENGINES FOR ELECTRIC LIGHT WORK.

Unexcelled for running Elevators, Wood-Tools, Printing Presses, or any kind of Machinery. SIZES: 1 to 25 HORSEPOWER.

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A few Good Second-hand Engines on Offer, taken in Exchange for larger sizes.

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ROCK BOTTOM PRICES TO THE TRADE.

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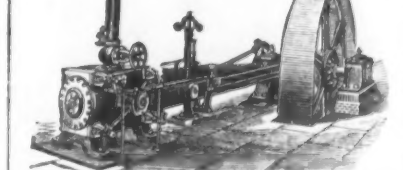
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with brake for quick and easy

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Circulars furnished.

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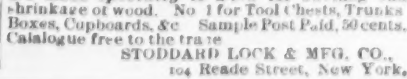
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Boston, W. R. RICEY, 114 Main

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760 and 762 Broad Street - PHILADELPHIA.

PAUL S. REEVES,

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Genuine Babbitt Metal

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Springs, Steel, Re-Rolled Norway  
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MANUFACTURERS OF THE OLD AND WELL-KNOWN

WHEELER MADDEN & CLEMSON

BRAND OF

**FILES.**

Middletown, Orange Co., New York.

Buyers who appreciate the highest class of goods will do well to give this brand a trial.

**EXTRA SUPERIOR CAST TOOL STEEL**

**LENG'S IMPROVED LEVER AND CAMGATE**

**QUICK OPENING VALVE**

**WELDLESS COLD DRAWN STEEL TUBES**

JOHN S. LENG, 4 FLETCHER ST NEW YORK

## PITTSBURGH STEEL CASTING CO.,

26TH AND RAILROAD STS., PITTSBURGH, PA.

MANUFACTURERS OF

Refined Bessemer Steel; Improved Steel Castings

UNDER HAINSWORTH'S PATENTS.

We are now prepared to fill orders for refined **BESSEMER BILLETS or BLOOMS** of any desired carbon and a uniform quality.

We would call attention of consumers to the fact that we use good material, and produce a steel pronounced by competent judges equal to the best English or German spring and soft steel. Having had twelve years' experience in the making of **STEEL CASTINGS**, we are able to refer to our customers in all parts of the United States and Canada as to the quality of our work in this line. We make castings of steel practically free from blow-holes, as soft and easily worked as wrought iron, yet stiff, strong and durable, with a tensile strength of not less than 65,000 pounds to be square inch. In short, our castings unite the qualities of steel and wrought iron. Wheels, Pistons, Cranks, Dies, Hammer Heads, Engines and Machinery Castings of all descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landslides. Special attention given to Heavy Castings. We use no cast-iron in our Castings. Send for circular.

**ROP HAMMERS.**

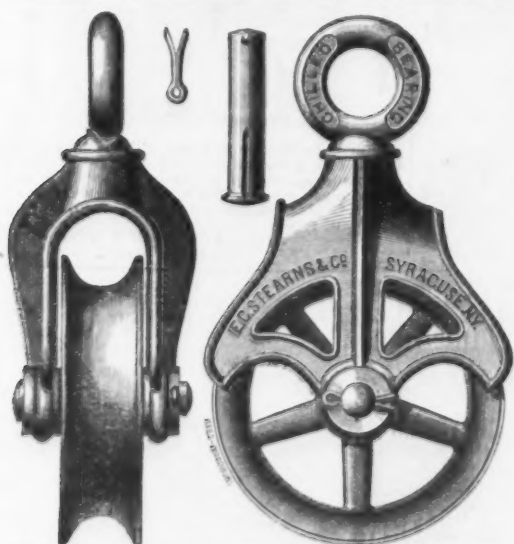
**Punching Presses.**

**DIES AND OTHER TOOLS**

FOR THE MANUFACTURE OF ALL KINDS OF  
**SHEET METAL GOODS,  
DROP FORGINGS, &c.**

Stiles & Parker Press Co.,  
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**HAY + FORK + PULLEY,**

STEARNS' NEW 5-INCH

With Hard Maple or Iron Wheel and Hardened Chilled Bearings.

Pipe can be removed to permit the rope to be put in or taken off, or for oiling. The rope is not injured by the pulley. The pulley is made of steel and is of the best quality. They are the cheapest pulleys in the market. Send for prices and discounts.

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## BRADLEY'S UPRIGHT CUSHIONED HELVE HAMMER



Established 1882.

Combines all the best elements essential in a first-class Hammer.

Has more good points, does more and better work and costs less for repairs than any other Hammer in the World.

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## BRADLEY'S HEATING FORGES.



ESTABLISHED 1882.

For Hard Coal or Coke. Indispensable in all shops to keep Bradley's Cushioned Hammers and anvils fully employed and reduces cost of production.

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MANUFACTURERS OF

**STEEL CASTINGS.**

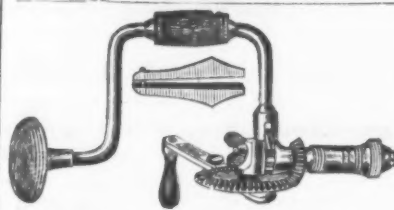
A Substitute for Steel and Wrought Forgings.

Circulars Sent on Application.

**STEEL CASTINGS**

Railroad and Machine Castings,  
1 lb. to 15 tons. Locomotive Cross  
Heads and Gearing a Specialty.

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This is a 10-inch sweep Ratchet Bit Brace, with a gear wheel, speeded about three to one, to be used for drilling iron. When not needed for drilling, this gear wheel can be taken off in one second. This Bit Brace is made of steel, highly polished and heavily nickel-plated, with a cocobola handle and lignumvitum head. It has two sets of forged steel jaws, which will hold square and flat shank tools of all shapes and sizes, and round twist drills from 7/16 to 1-1/2 inch in diameter. The ratchet attachment enables the Brace to be used in places where there is not room to revolve the sweep. Many attempts have been made to imitate the outside appearance of our Barber Improved Brace, but no one dares to use our Patent Jaws, as seen in this cut, and no brace is good without them. We guarantee these too to be perfect in every respect, and that they will give great satisfaction to all who use them. Hardware dealers will furnish them on demand at our price, which is Three Dollars each.

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FINE TAPS AND DIES.



**LIGHTNING AND GREEN RIVER  
SCREW PLATES**

BOLT CUTTERS, HAND AND POWER.  
DRILLING MACHINES, PUNCHING PRESSES,  
TIRE BENDERS, TIRE UPSETTERS  
And Other Labor Saving Tools.  
Send for Price List.

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Spring Catalogue sent free.

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(Near Approach to New York & Brooklyn Bridge.)

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**AXES, ADZES,  
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Orders and Correspondence Solicited.

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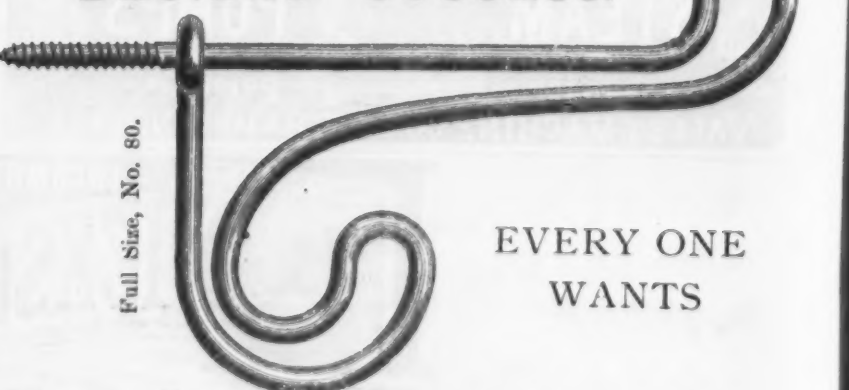
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